

## Four Brothers Dairy

### Environmental Management Plan

Agriculture . . .  
Launching into  
the Future



### Environmental Management Plan Prepared For:

Andy, Jerome, Clem, Lawrence Fitzgerald

Four Brothers Dairy

### Certified Planner:

Matthew Thompson

Owner, AgTec

(b) (6)

Producer Signature:

*by Andrew Fitzgerald* SEC-TRCS

Certified Planner Signature:

*Matthew Thompson*

The information provided by those using the "Idaho OnePlan" shall be deemed to be trade secrets, production records, or other proprietary information and shall be kept confidential and shall be exempt from disclosure pursuant to section 9-340d, Idaho code (title 22 chapter 27.17d6)

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## PRODUCER SUMMARY

### Dairy Information

<b>Facility Name</b>		Four Brothers Dairy	
<b>Facility Address</b>		425 N 250 W	
<b>Operator Information</b>		Andy, Jerome, Clem, Lawrence Fitzgerald	<b>Home Phone</b> (b) (6)
<b>Mailing Address</b>		425 N 250 W, Shoshone, ID, 83352	<b>Barn Phone</b> (000) 000-0000
			<b>Cell Phone</b> (b) (6)
<b>Manager Information</b>		Andy, Jerome, Clem, Lawrence Fitzgerald	<b>Home Phone</b> No Data
<b>Manager Address</b>		425 N 250 W, Shoshone, ID, 83352	<b>Cell Phone</b> (b) (6)
<b>County</b>		Gooding	
<b>GPS</b>	<b>Barn 1</b>	43.0014 deg N	114.4554 deg West
	<b>Barn 2</b>	43.0061	114.4532
	<b>Barn 3</b>	43.0102	114.4493
	<b>Barn 4</b>	43.0142	114.4588
	<b>Barn 5</b>	43.0070	114.4554

### **Farm Location**

#### Idaho Transverse Mercator

Coordinates of the farm center (meters): X = 2468469.54146555, Y = 1303421.52731208

Map Scale: 1 : 1941

### **Figure 1. Base Map**

### **Farm Location**

#### Idaho Transverse Mercator

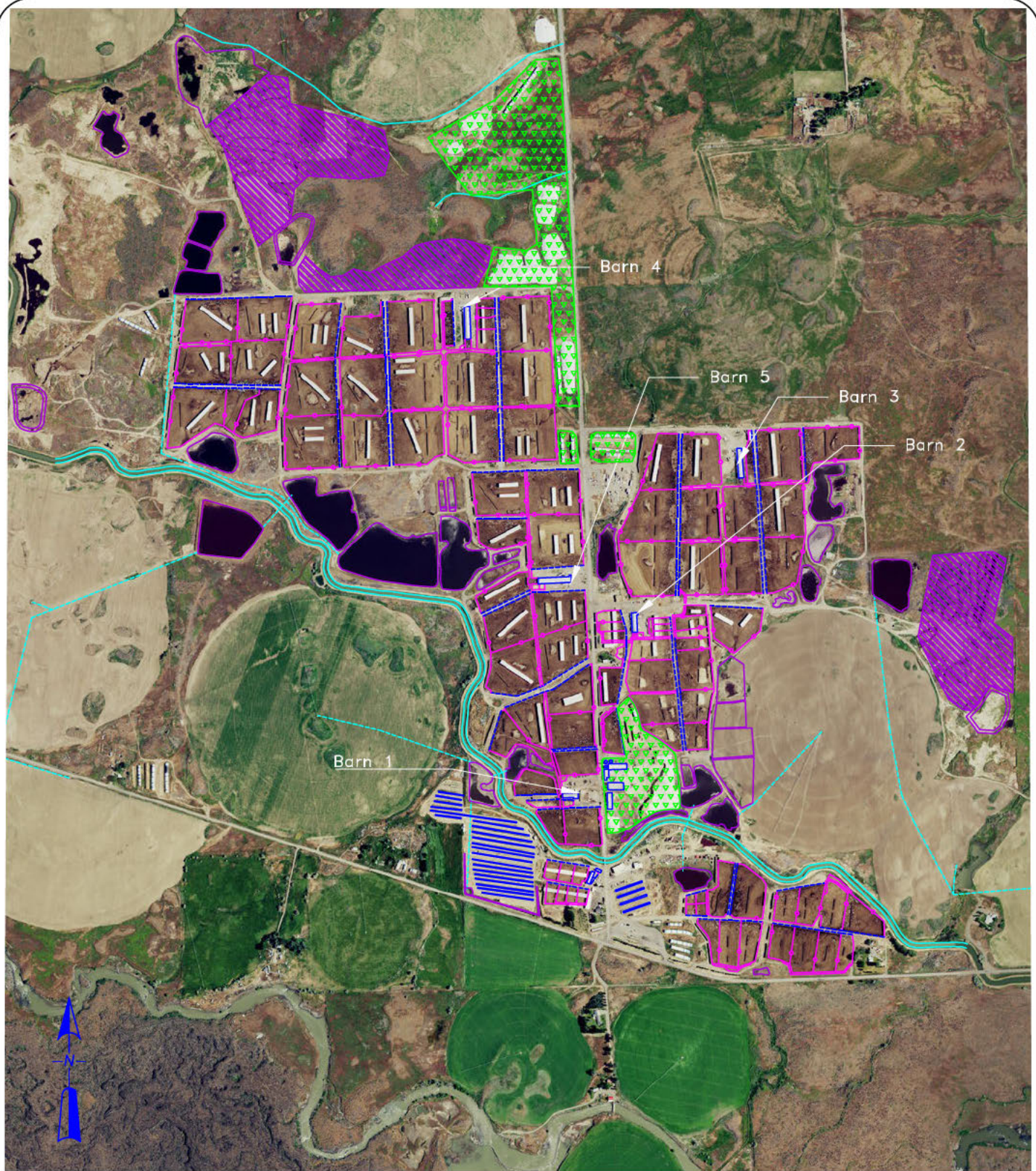
Coordinates of the farm center (meters): X = 2468469.54146555, Y = 1303421.52731208

Map Scale: 1 : 1941

### **Figure 2. Farmstead Map**

### **Resource Concerns**

<b>Resource Concern:</b>	Surface Water
<b>Soil Conservation District:</b>	Gooding
<b>Watershed Basin:</b>	Big Wood
<b>Hydrologic Unit Code:</b>	17040219
<b>Stream Segment:</b>	Wood River



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**AG**<sup>TEC</sup>

DESIGNED BY: MWT

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DATE: 4/22/19

FILE NAME: SITE PLAN050818.DWG

Full Complex  
4 Brothers Dairy

SCALE: 1" = 1320'

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SHEET: 1 OF 1

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DATE: 4/25/19

5/6/2019

FILE NAME: SITE PLAN101215.DWG

Barns 1 & Heifer  
4 Brothers Dairy

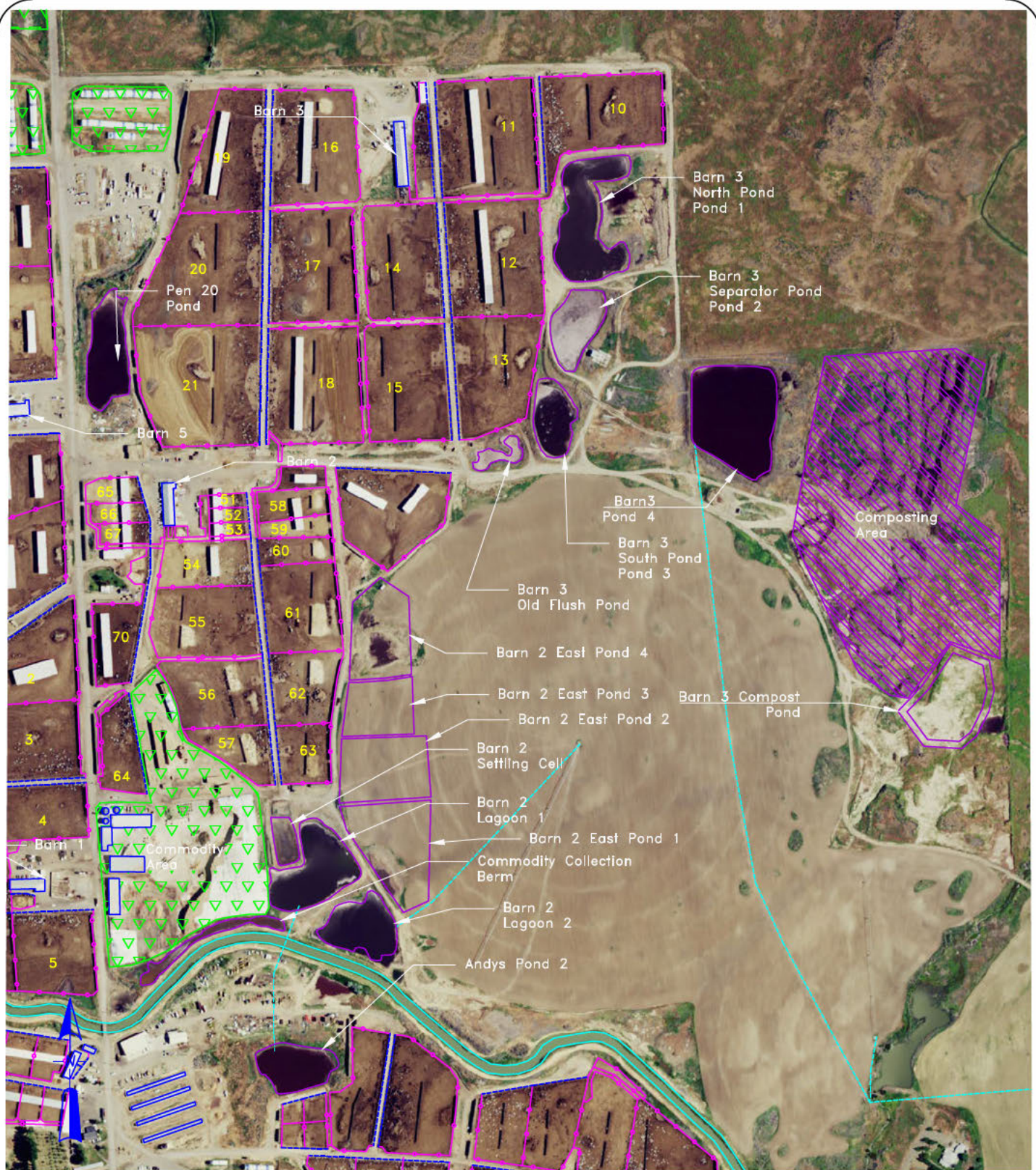
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DATE: 2/23/17

FILE NAME: SITE PLAN101215.DWG

Barn 3 and 2  
4 Brothers Dairy

SCALE: 1" = 600'

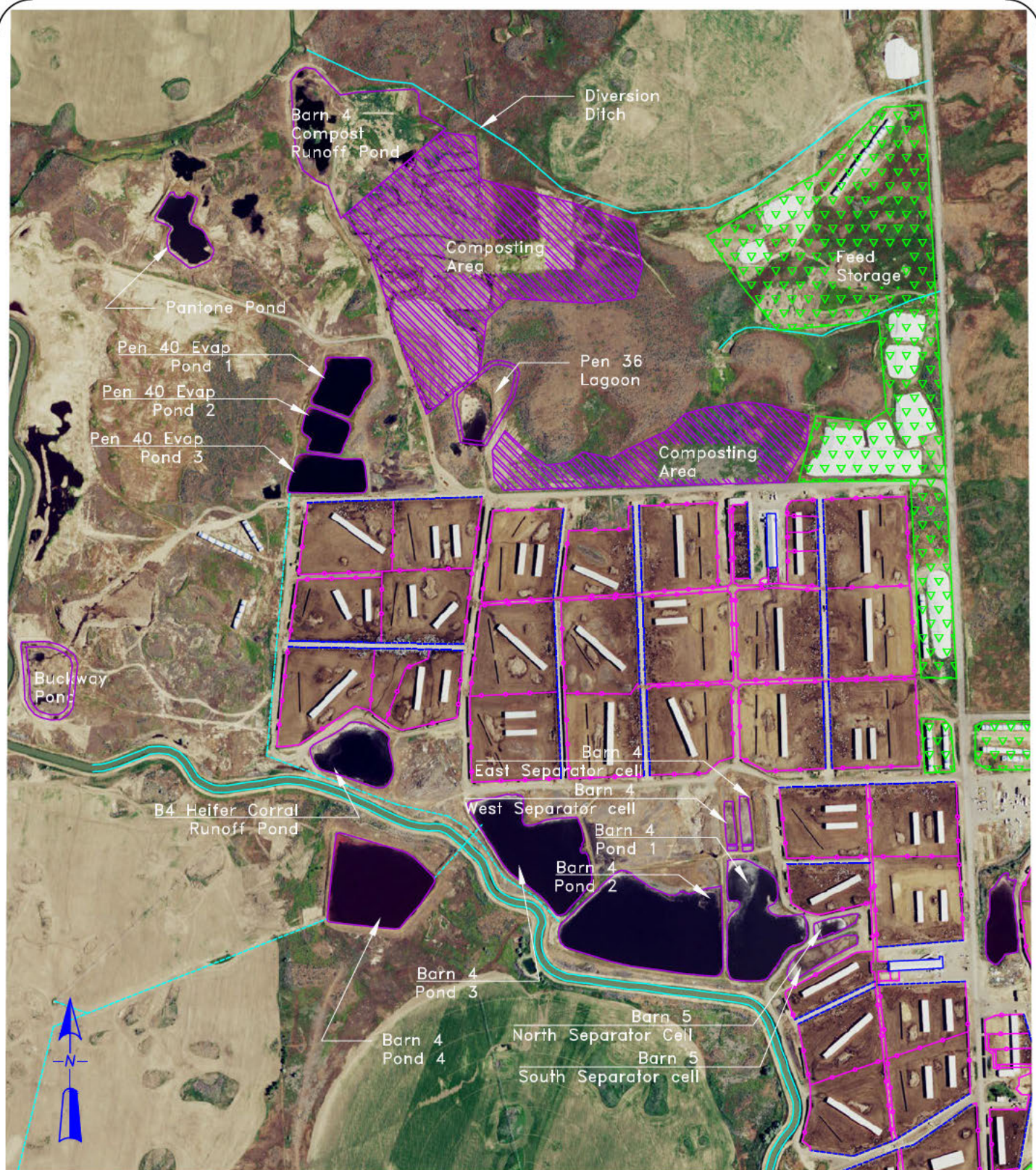
SHOSHONE - LINCOLN

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DATE: 4/25/19

FILE NAME: SITE PLAN101215.DWG

Barns 4 and 5  
4 Brothers Dairy

SCALE: 1" = 800'

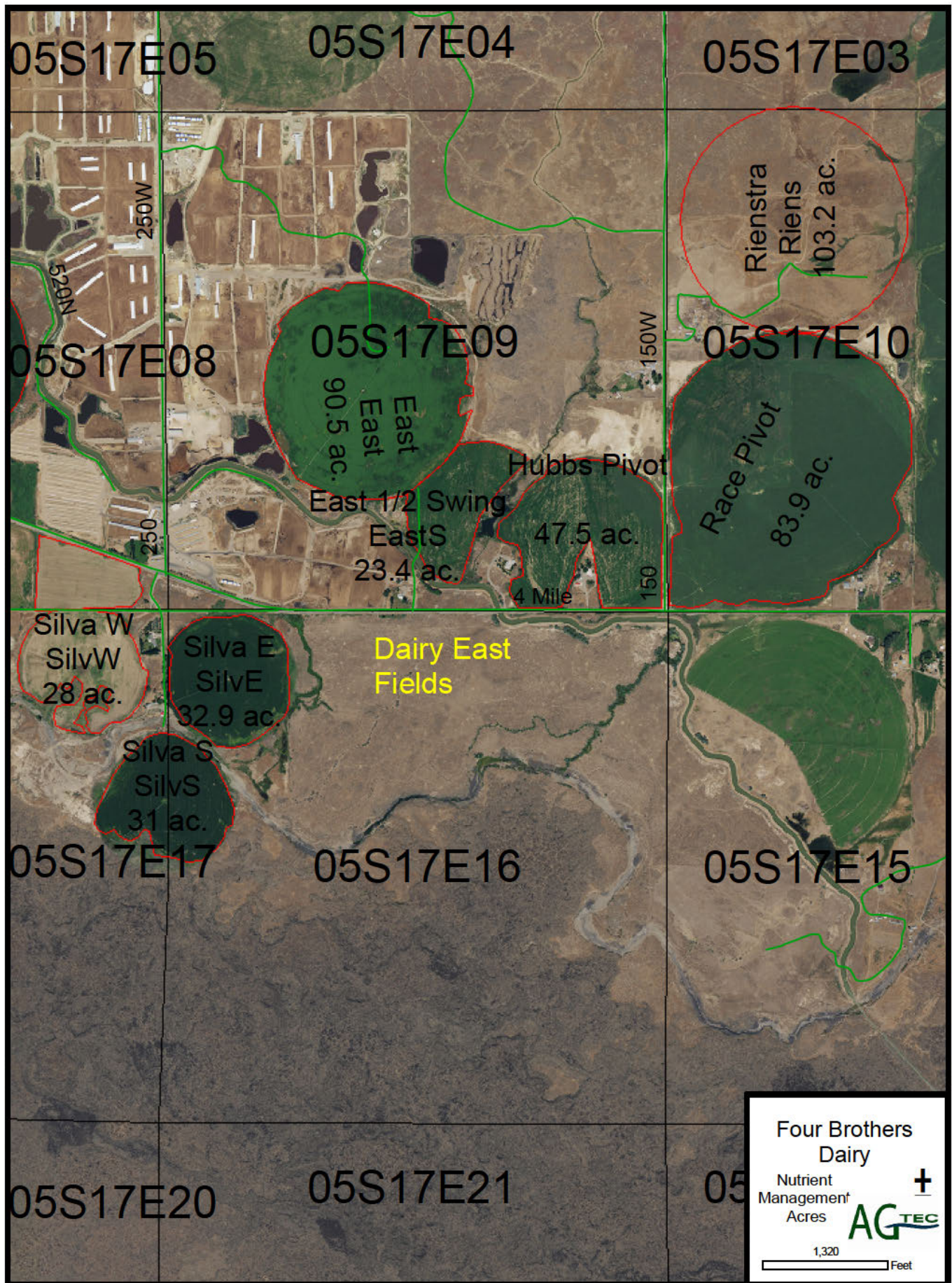
SHOSHONE - LINCOLN

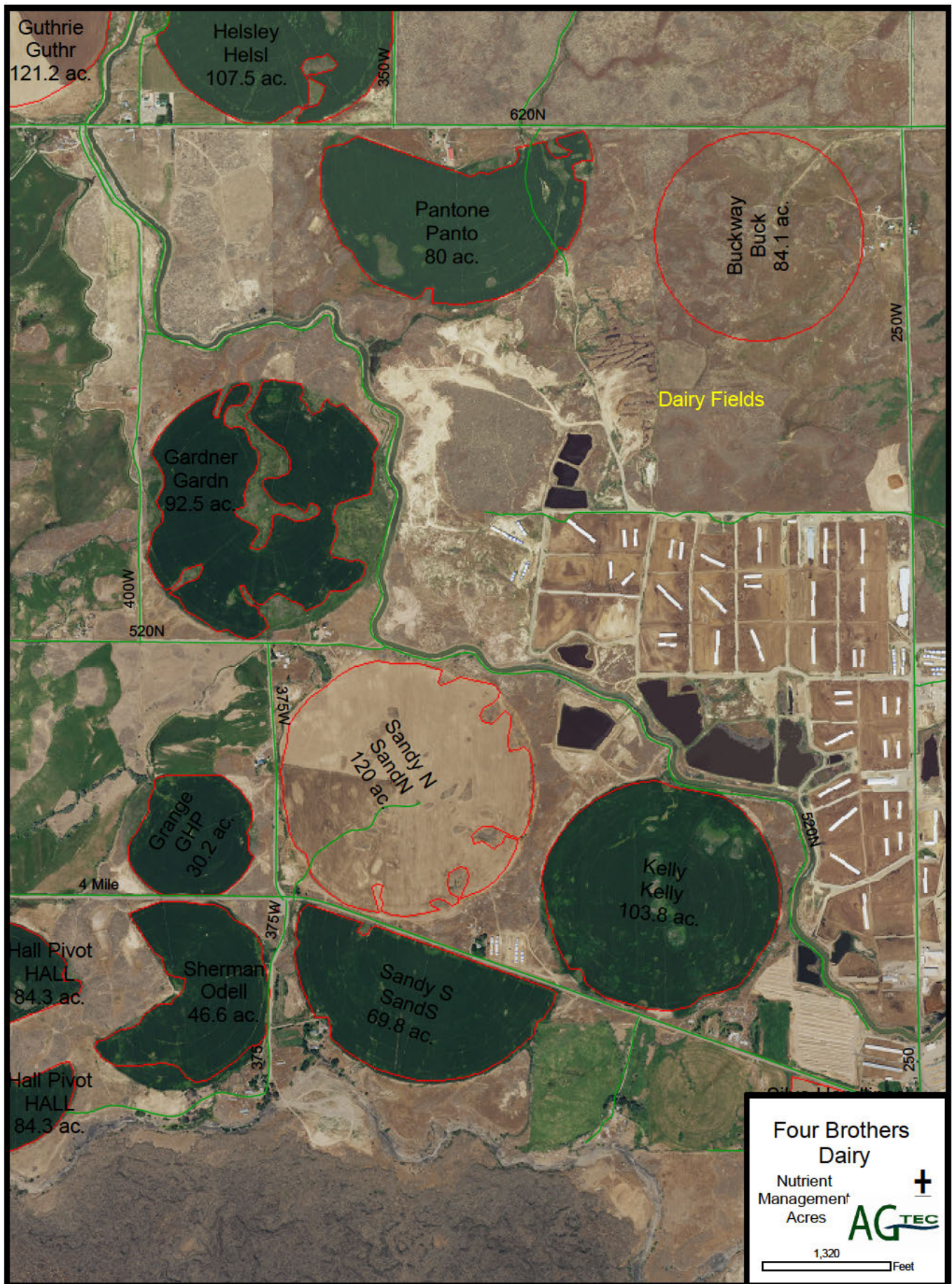
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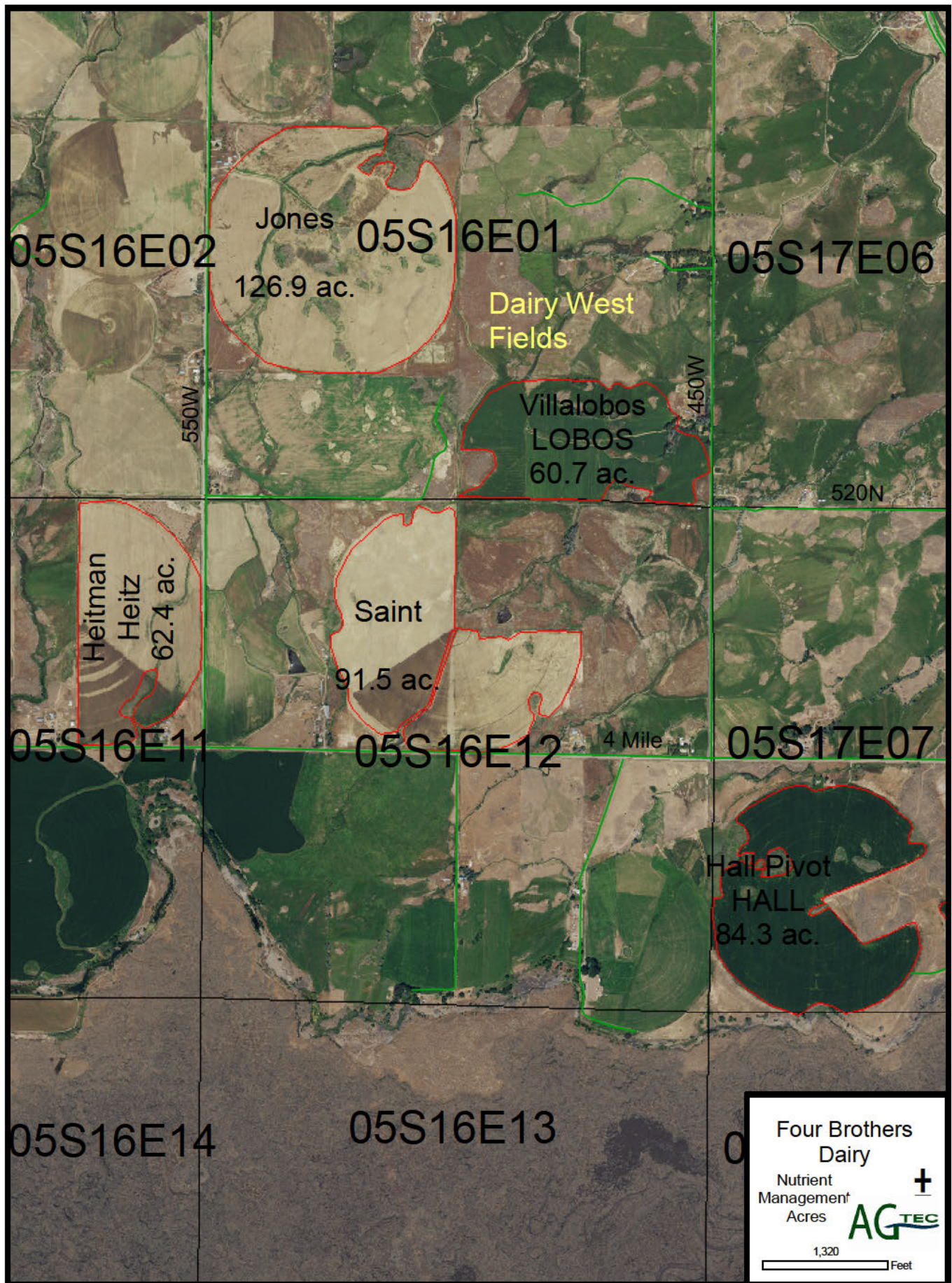
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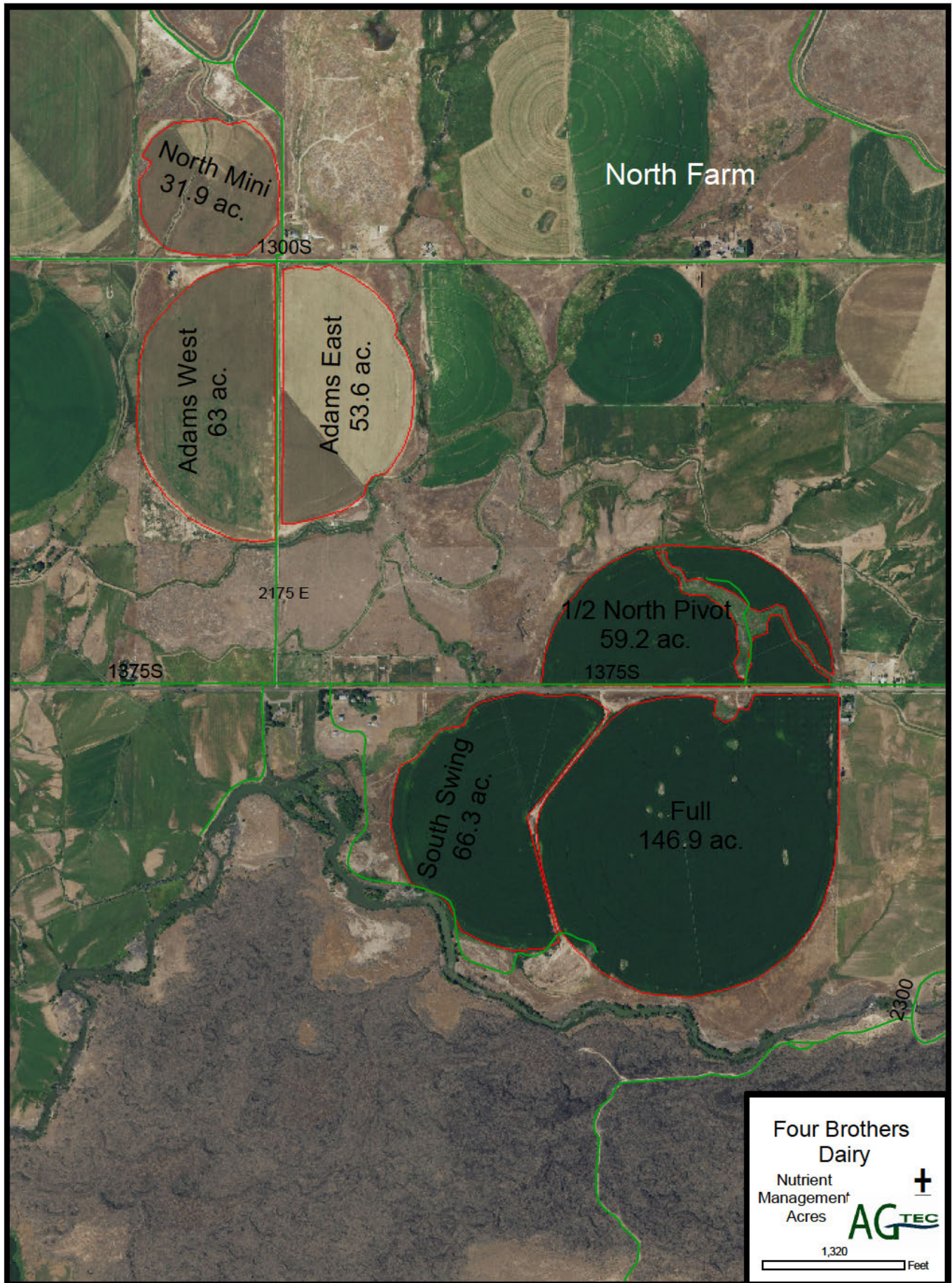
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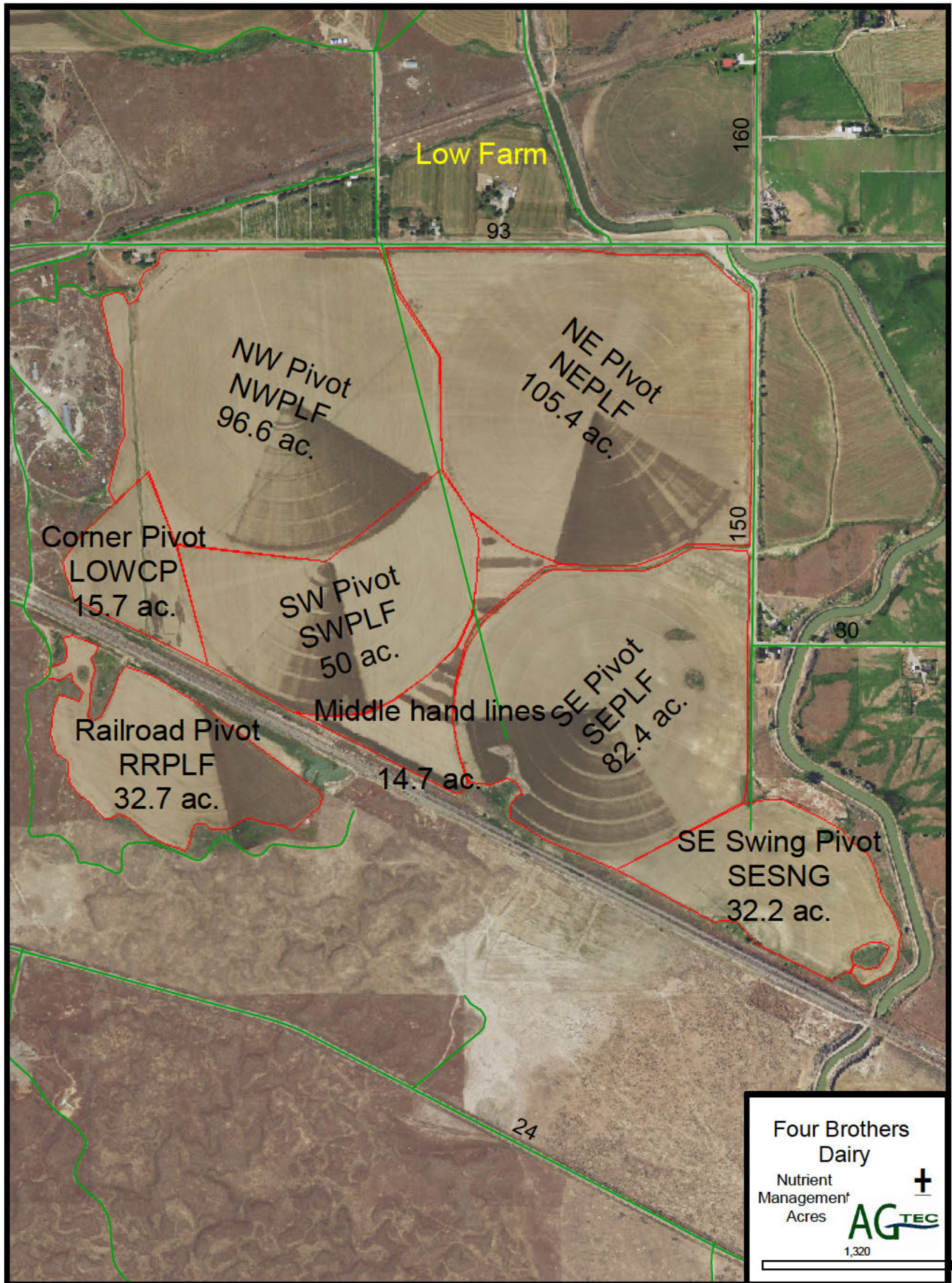


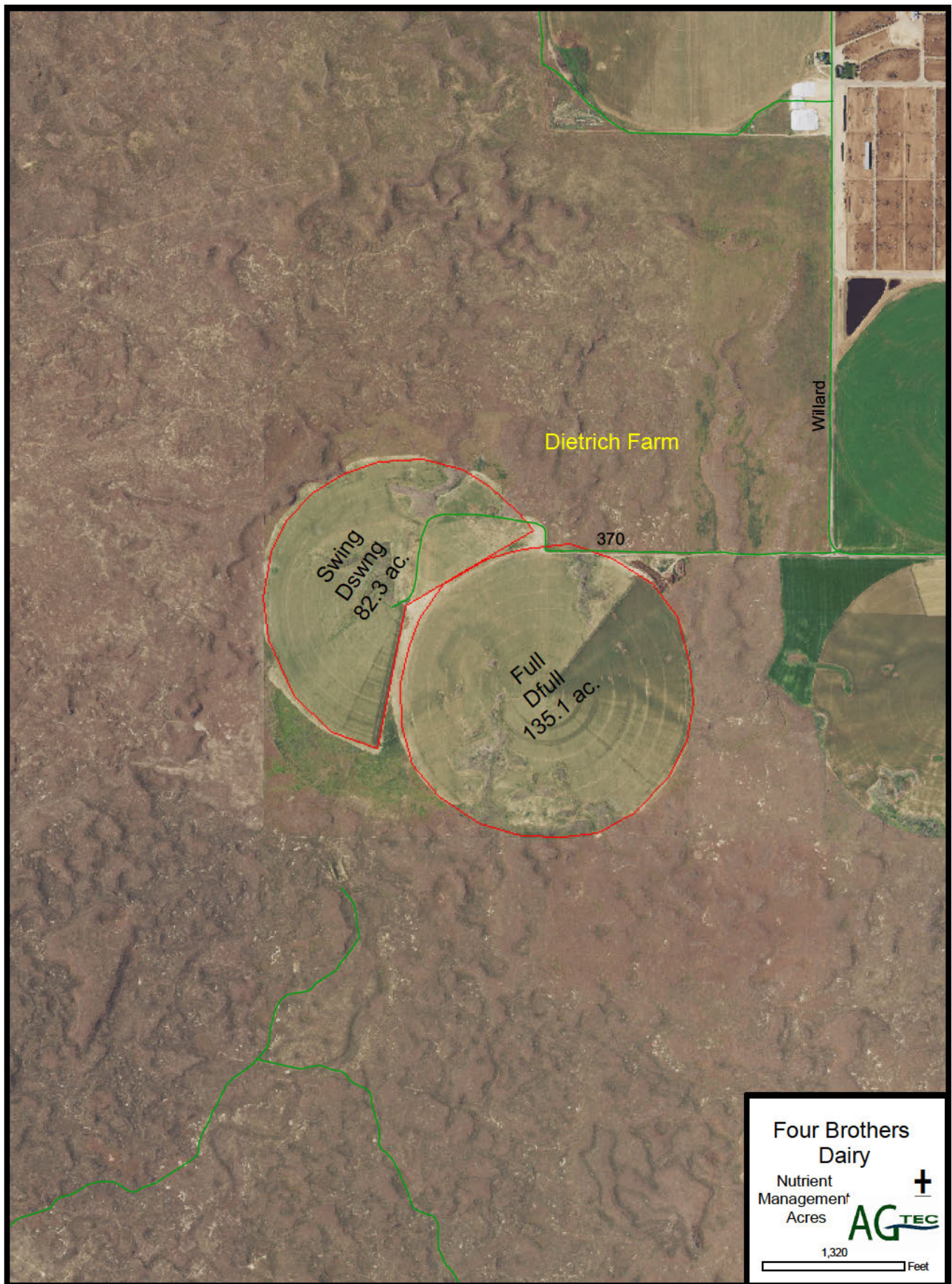












### Animal Class

description	animal	number	average animal weight	housing	bedding type	bedding (tons)	waste (tons)
Milking Barn 1	Dairy - Lactating Cow (80 lb/d milk avg)	1,500	1,300	Open Lot	Long Straw	3,310	39,197
Milking Barn 2	Dairy - Lactating Cow (80 lb/d milk avg)	1,000	1,300	Open Lot	Long Straw	2,206	26,131
Milking Barn 3	Dairy - Lactating Cow (80 lb/d milk avg)	2,750	1,300	Open Lot	Long Straw	6,068	71,861
Milking Barn 4	Dairy - Lactating Cow (80 lb/d milk avg)	2,750	1,300	Open Lot	Long Straw	6,068	71,861
Milking Barn 5	Dairy - Lactating Cow (80 lb/d milk avg)	2,000	1,300	Open Lot	Long Straw	4,413	52,262
Dry Cows	Dairy - Dry Cow	1,400	1,300	Open Lot	Long Straw	3,089	16,936
Replacement Bulls	Beef - High forage diet	228	650	Open Lot	Long Straw	252	2,814
Breeding Bulls	Beef - High forage diet	228	1,500	Open Lot	Long Straw	580	6,494
Calves	Dairy - Calf	1,170	330	Crates	Long Straw	352	5,844
Weaned Calves	Dairy - Calf	1,170	330	Covered Shed	Long Straw	381	5,844
Open Heifers	Dairy - Heifer	2,796	970	Open Lot	Long Straw	4,603	27,708
Bred Heifers	Dairy - Heifer	3,567	970	Open Lot	Long Straw	5,872	35,348

<b>Total Acres Available for Nutrients Owned by the facility</b>	3,065
<b>Total Acres Available for 3<sup>rd</sup> Party Export</b>	16,202

### Nutrient Distribution on Facility

	Pounds N	Pounds P <sub>2</sub> O <sub>5</sub>	Pounds K <sub>2</sub> O	% of Total	Weight (in Tons)
<b>Total Nutrients Produced</b>	1,511,696	1,672,667	2,821,298	---	---
<b>Solid Stack(s)</b>	1,496,983	1,647,018	2,777,772	99	393,325
<b>Waste Storage Pond(s)</b>	14,713	25,649	43,526	1	7,643
<b>Nutrients Exported</b>	1,337,310	1,471,341	2,481,485	88	
<b>Nutrients Onsite</b>	174,386	201,326	339,813	12	

### Available Storage Summary

	Existing (ft <sup>3</sup> )	Proposed (ft <sup>3</sup> )
<b>Available Solid Storage</b>	9,180,000	0
<b>180 Required Liquid Storage</b>	12,100,000	
<b>Available Liquid Storage</b>	15,800,000	

## Container Storage Summary

Container Name	Volume (ft3)	Storage Period (Days)	Length	Width	Depth	Freeboard	Slope
B1 Separator Pond	35,991	180	225.0	72.0	4	1	3
B1 Lagoon 1	173,115	180	330.0	166.0	4.5	1	2
B1 Lagoon 2	1,252,387	180	423.4	300.0	15	2	2.7
Calf Berm	144,937	180	600.0	250.0	2	1	2
SW Pump Pit	8,661	180	77.0	67.0	4.5	2	2
B2 Settling	47,256	180	200.0	100.0	4	1	3
B2 Lagoon 1	544,920	180	420.0	200.0	8.5	1	2
B2 Lagoon 2	242,222	180	290.0	175.0	6.5	1	2
B2 East 1	706,324	180	391.8	370.0	6.5	1	3
B2 East 2	594,475	180	396.3	286.0	7.1	1	3
B2 East 3	213,624	180	310.5	224.0	4.5	1	3
B2 East 4	77,243	180	332.9	165.0	2.5	1	2
Commod Collect Berm	26,384	180	700.0	36.0	2.5	1	3
B3 Pond 1	234,168	180	512.0	172.0	4	1	3
B3 Pond 2	370,211	180	361.0	172.0	8	1	2
B3 Pond 3	202,929	180	335.0	169.0	5	1	2
B3 Pond 4	564,069	180	420.0	365.0	6	2	2
B3 Old Flush	90,805	180	222.0	120.0	5	1	2
B3 Compost Pond	451,985	180	449.1	280.0	5	1	3
Pen 20 Pond	220,501	180	340.0	180.0	5	1	2
B4 East Sep Cell	49,608	180	316.0	64.0	4	1	2
B4 West Sep Cell	37,572	180	282.0	56.0	4	1	2
B5 North Sep Cell	54,861	180	225.0	95.0	4	1	2
B5 South Sep Cell	213,467	180	475.0	84.0	9	1	2.5
B4 Pond 1	1,003,656	180	677.0	280.0	7	1	3
B4 Pond 2	704,632	180	920.0	400.0	3	1	3
B4 Pond 3	1,603,413	180	780.0	331.0	8	1	3
B4 Pond 4	1,066,812	180	477.0	424.0	8	2	2
Pen 40-1	378,523	180	353.4	300.0	5	1	3
Pen 40-2	226,385	180	254.0	215.0	6	1	3
Pen 40-3	369,700	180	416.0	208.0	6	1	3
Pen 36	368,985	180	479.5	174.0	6.5	1	3.5
B4 Compost Runoff Pond	1,359,818	180	723.2	500.0	5	1	3
Pantone	453,364	180	400.1	260.0	6	1	3
Buckway	838,661	180	393.1	270.0	11	1	3
B4 Heifer Runoff Pond	252,225	180	251.0	240.0	6	1	3
Andys Pond 1	62,620	180	174.0	67.2	13	1	2.3
Andys Pond 2	564,529	180	318.0	180.0	14	1	2

\*B1,B2 etc are Barn 1, Barn 2 abbreviations etc.

### Planner Information

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<b>Fax:</b>	No Data
<b>Certification #:</b>	1021

## **Facility Summary**

Four Brothers Dairy is an existing dairy operation located at 425 N 250 W Shoshone, ID 83352. The dairy is owned and operated by Andy, Clem, Jerome, and Lawrence Fitzgerald. They are currently milking approximately 10,000 cows with 1400 dry cows and an additional 228 bulls and 8,931 replacement calves, bulls & heifers. All of the cows, bulls, and heifers will be housed in open lots. The mature cows will weigh approximately 1300 lbs, the bulls 1500 lbs, and the heifers 970 lbs. The calves will be housed in hutches or covered sheds and will average approximately 330 lbs. Replacement young bulls will average 650 lbs. The facility contains approximately 25% jersey or crossbreds which yields the weighted average of 1300 lbs. The Nutrient Management Plan was designed for these proposed animal numbers.

## **Parlor Descriptions**

There are 5 dairy parlors on the facility. The commercial use for each parlor was developed using the following information. All parlors use plate coolers using 2 gallons of water for each gallon of milk cooled. A glycol chiller is used to further chill the milk to appropriate storage temperatures. Clean water use is recycled to the water storage tank and reused for parlor cleanup and for cattle drinking. All parlors are manually washed down using a pressure hose in the parlor and holding pens. There are no back flush or deck spray systems in any of the parlors.

Parlor 1- Double 20 Herringbone Parlor with 1500 cows milked up to 3 times per day. There are 2 bulk tanks at the parlor with 7,000 gallon capacity each. There is currently around 4 hrs of down time per day at the parlor. The pipelines are cleaned with 4 cycles of 125 gallons. The bulk tanks are each picked up daily and cleaned using 900 gal per tank. The parlor is washed between milking using a 30 gpm hose for 40 minutes.

Parlor 2 -Double 16 Parallel parlor with 1000 Cows being milked 3 times per day. There is 1 silo for milk storage and 1 bulk tank for calf milk storage. The silo stores 8,000 gallons of milk and the bulk tank 1,500 gallons. Both tanks are cleaned each day using a combined 1100 gallons. The pipelines are cleaned using 4 cycles of 100 gallons. The parlor and holding pen are washed after each milking using two 30 gpm hose for 20 minutes.

Parlor 3- Double 40 parallel parlor with 2750 cows being milked 2 times per day. There are 2 bulk tanks with 8,000 gallon capacity each and a 20,000 gallon silo. Two of the tanks are cleaned each day using a combined 1800 gallons per day. The pipelines are cleaned using 4 cycles of 150 gallons. The parlor and holding pen are washed after each milking using two 30 gpm hose for 30 minutes.

Parlor 4- Double 40 parallel parlor with 2750 cows being milked 3 times per day. There are 2 silos with 20,000 gallons of storage each. These are cleaned roughly 1.5 times per day using an average of 2250 gallons per day. The pipelines are cleaned 3 times per day using 4 cycles of 150 gallons. The parlor and holding pen are cleaned after each milking using two 30 gpm hoses for 20 minutes.

Parlor 5 - Double 30 parallel parlor with 2000 cows being milked 3 times per day. There is a 8,000 gallon capacity bulk tank and a 20,000 gallon silo. There is one tank cleaned each day using 1100 gallons. The pipelines are cleaned using 4 cycles of 125 gallons each milking. The parlor and holding pen are cleaned after each milking using two 30 gpm hoses for 20 minutes.

The liquid waste system for each of the parlors utilizes a gravity earthen separator or separators followed by a series of wastewater storage ponds. Wastewater from these ponds is land applied to facility owned farm ground generally before planting and after harvest. Barns 4 and 5 utilize an evaporative pond system to handle the parlor water from these barns. The Fitzgeralds farm approximately 3,065 acres that are utilized for manure application. All excess manure is exported to the 3<sup>rd</sup> party recipients listed in the plan. Adequate acreage should be available for the application of waste generated on the facility.

## **Waste System Descriptions**

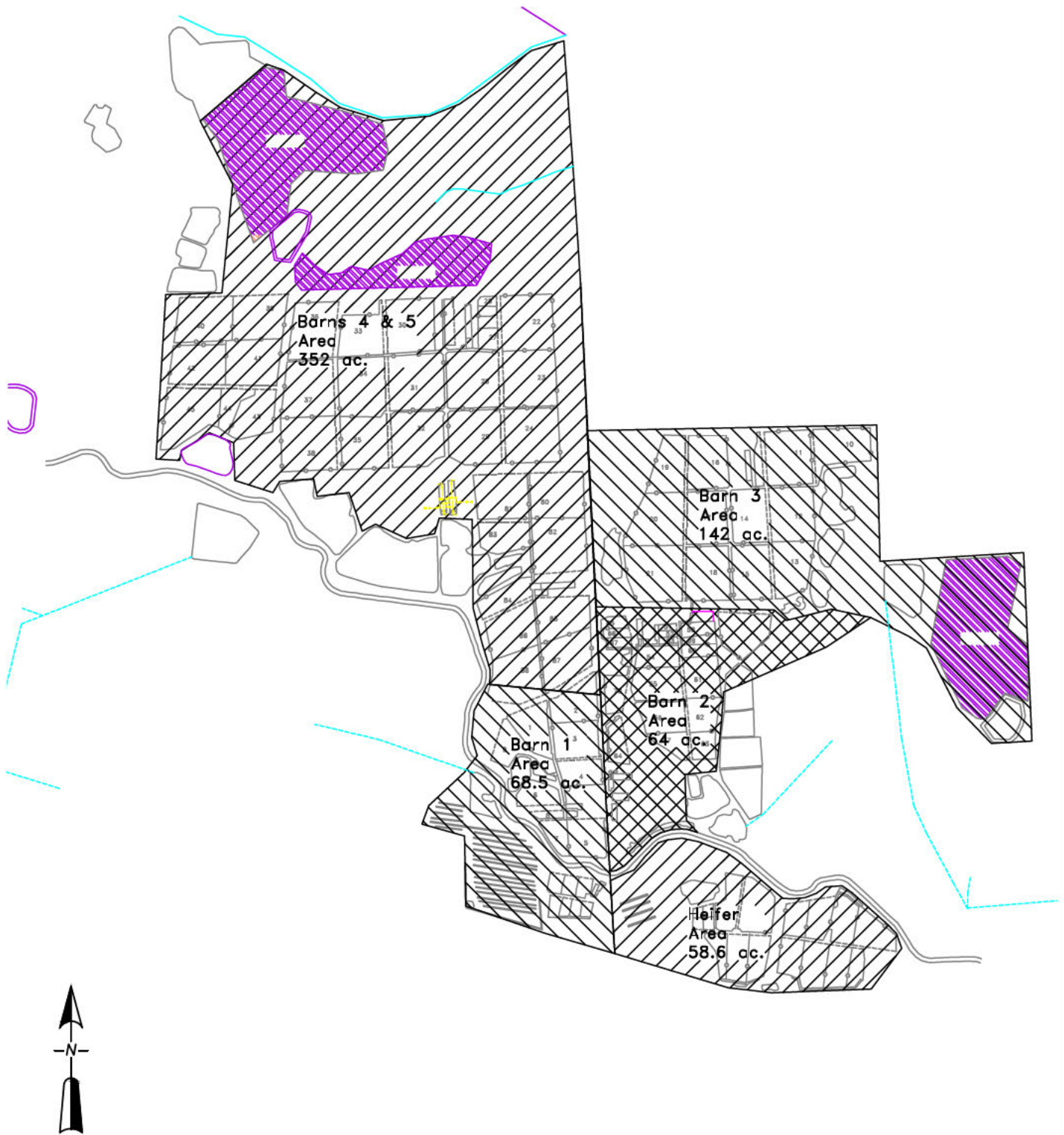
The waste and runoff control systems for each parlor or runoff area will be described below. The facility has been broken into 5 runoff control areas. Each of these areas has ponds associated with it for the storage of parlor process water and runoff. These areas are broken out below and the mapping of these areas is shown on the map titled 'Runoff Areas' in this section. The parlor use, runoff volumes and pond storage capacities are shown on the AGTEC Lagoon Design sheet for each area in Appendix R. Each of these estimates include 5 years of sludge accumulation in the lagoon system and precipitation on the lagoon surface and the direct addition of parlor manure to the lagoon system.

### ***Barn 1 Area***

The Barn 1 area includes the corrals that drain to the barn 1 containment system and the calf raising and young heifer corrals on the west side of the access road. The dairy parlor and milking cow corrals are located on the east side of the canal. The parlor conveys process water into the Barn 1 Separator Pond. The corral runoff drains directly into Barn 1 Lagoon 1. Lagoon 1 overflows through a pipeline suspended over the canal into Barn 1 lagoon 2. The calf area has a berm referred to as Calf Berm and a Southwest Pump Pit located on the southwest corner of the calf area. There is a pipeline connecting this pit to B1 Lagoon 2.

The contributing runoff area is mapped as 68.5 acres. The required storage volume for this area is 1.32 million cubic feet and the available storage is 1.62 million cubic feet. This area has adequate capacity to meet the 180 day storage requirement.

### **Heifer Area**



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(b) (6)



DESIGNED BY: MWT

DRAWN BY: MWT

DATE: 4/22/19

5/6/2019

FILE NAME: SITE PLAN050819.DWG

Runoff Areas  
4 Brothers Dairy

SCALE: 1" = 1320'

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SHEET: 1 OF 1

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The Heifer area includes the corrals on the south side of the canal and east of the access road into the dairy site. The corral runoff drains directly into Andys Pond 1. This pond is connected to Andys Pond 2 with a pipeline and water is conveyed to pond 2 on an as needed basis. Andys Pond 2 is connected to the Barn 2 Containment system with a pipeline that is suspended above the canal. There are some low spots in the corrals in the heifer area and these evaporate or are removed using a portable pump or tanker wagon and placed directly into either of the Andys Ponds.

The contributing runoff area is mapped as 58.6 acres. The required storage volume for this area is 0.60 million cubic feet and the available storage is 0.63 million cubic feet. This area has adequate capacity to meet the 180 day storage requirement.

### Barn 3 Area

The Barn 3 area includes the corrals that drain to the barn 3 containment area and includes the composting area and containment immediately east of Barn 3. This area is comprised from the area south of the access road to Barn 3 and the area north of the access road to Barn 2. The corrals predominately drain south toward the Barn 2 access road and is collected in the Old flush lagoon. A portion of the site on the west side drains toward the west or southwest and is collected directly into the Pen 20 Pond. Pens on the East side of the site can drain directly into the Barn 3 lagoons 1, 2 or 3. The parlor conveys process water into the Barn 3 Pond 2. The water is separated using a mechanical screen and then is discharged into Barn 3 Ponds 1 or 3. The waste water from these lagoons is then transferred to Barn 3 Pond 4 using a pump and portable pipe. The composting area east of Barn 3 drains runoff directly into the Barn 3 Compost Pond.

The contributing runoff area is mapped as 142 acres. The required storage volume for this area is 2.62 million cubic feet and the available storage is 2.13 million cubic feet. This area doesn't have adequate capacity on its own to meet the 180 day storage requirement. This area is located upgradient of the Barn 2 storage system. Excess production from this area flows to the Barn 2 system. The barn 2 system therefore must allow for roughly 0.48 million cubic feet of capacity.

### Barn 2 Area

The Barn 2 area includes the corrals that drain to the barn 2 containment system and the feed storage and processing area on the east side of the facility access road. The dairy parlor and milking cow corrals are located on the north side of the canal. The parlor conveys process water into the Barn 2 Settling Cell. This cell then flows to Barn 2 Lagoon 1 and Lagoon 2. These lagoons are then manually transferred to the East Ponds 1,2,3 or 4 via portable pump and pipe. The corral runoff drains predominantly directly south into Barn 2 Settling Cell 1. The feed storage and processing area drains directly to the Commodity Collection Berm which overflows into Barn 2 Lagoon 1. The corrals on

the northeast corner of this area can flow directly into the East Pond 4. The east ponds overflow from pond 4 to pond 3 to pond 2 to pond 1. Pond 1 being of lower elevation than the other ponds.

The contributing runoff area is mapped as 64 acres. The required storage volume for this area is 1.39 million cubic feet and the available storage is 2.45 million cubic feet. This yields a surplus of 1.06 million cubic feet. Including the Barn 3 excess process water of 0.48 million cubic feet yields a net excess of 0.58 million cubic feet of capacity. This area has adequate capacity to meet the 180 day storage requirement.

#### Barns 4 & 5 Area

The Barn 4 & 5 area includes the corrals that drain to the barn 4 and 5 containment system. This area includes the feed storage and composting located north of barn 4 and the corrals located south of barn 4 and around barn 5. All these areas are located on the west side of the facility access road and north of the canal. These two parlors have separate primary separator cells and then are combined for the longer term storage of the process water from these two barns. The barn 4 parlor drains parlor water into the Barn 4 east or west separator cells. These cells overflow to the Barn 4 Pond 1. The barn 5 parlor drains parlor water into the Barn 5 north or south separator cells. These cells overflow to the Barn 4 Pond 1. Barn 4 Pond 1 then overflows to the Barn 4 Pond 2 which flows to Barn 4 Pond 3. Pond 3 is connected to Barn 4 Pond 4 via a suspended pipeline over the canal. Most of the corrals drain runoff directly to the south into Barn 4 ponds 1, 2 and 3. The west side of the corrals drain to the south into the Heifer Corral Runoff Pond. Water from Ponds 2 and 3 can be transferred via pipeline to the Pen 40 Evap Ponds 1, 2 & 3. The Pen 40 ponds can then be transferred to the Pen 36 Lagoon, the Buckway Pond or Compost Runoff Pond using a portable pump and pipe. The feed storage and composting area north of Barn 4 drain in two directions. The south portion of this area drains to the southwest corner of the area on the south side of the Pen 36 Lagoon. This water is then transferred using portable pump into the Pen 36 lagoon. Excess runoff or if flow exceeds the pump capacity, the runoff will flow overland through the pens 39, 41 and 44 into the heifer corral runoff pond. The north portion of the composting area will drain runoff to the west into the Barn 4 Compost Runoff Pond. This pond is then transferred to the Pantone Pond using a portable pump and pipe. There is a diversion ditch on the north side of the composting area to prevent off site runoff from the north or east from entering the site.

The contributing runoff area is mapped as 352 acres. The required storage volume for this area is 6.17 million cubic feet and the available storage is 8.98 million cubic feet. This area has adequate capacity to meet the 180 day storage requirement.

## **Resource Concerns**

The facility is in the Big Wood Hydrologic Unit #17040219 near the Big Wood River. This stream segment is water quality limited for Bacteria, Dissolved Oxygen, Flow Alteration, Nitrates, Nutrients, and Sediment.

The primary resource concerns on the facility is surface water quality. Although all fields are sprinkler irrigated, runoff water from the fields listed as a surface water concern has the potential to flow into drainages that will carry it to the canal or river. There are two new fields with pivots being installed this year. The Rienstra and Villalobos fields will be cropped this year.

Liquid waste is currently plumbed to the Silva West, East and South pivots. The Kelly and East pivots. The Buckway pivot is plumbed and will receive liquid waste this year. The Sandy North and Pantone are planned to be incorporated into the liquid waste system this nmp cycle. The East 1/2 swing and Hubbs pivot are also considered to be added if needed this cycle.

## **Storage and Handling Plan Requirements**

There are several wastewater containment structures currently located on the facility. Estimated dimensions for these structures are shown in the plan. It is estimated that together they will provide approximately 15,811,038 cubic feet of liquid storage. The AgTec sizings for these facilities that 12,100,000 cubic feet of liquid storage will be needed to meet the 180-day storage requirement. If storage ponds are cleaned and properly managed, adequate wastewater storage should be available on the facility.

## **Hydraulic Balance**

Hydraulic Balance Date Liquid Waste applications are to begin and end within the growing period of the active crop. Fall application of liquid effluent must be completed prior to November 15th. Applying waste outside the annual application window may be allowed upon ISDA approval, however no applications will be permitted on frozen or snow covered ground. You must contact the Department of Agriculture, Dairy Bureau at (208) 332-8550 prior to any wastewater application outside of the application season. The need for wastewater application outside of the irrigation season will be evaluated on a case by case basis. Factors considered in granting approval will be, but are not limited to, the following:

- Date
- Existing and forecasted weather conditions
- Moisture content of the soil
- Water holding capacity of the soil

- Frost layers in the soil
- Crop needs

## **Environmental/Nutrient Management Plan Requirements**

The producer shall maintain field level records for a minimum of five years, making them available for review upon routine reviews and inspections by ISDA personnel. Records must include the following:

- **Soil Tests:** The producer must soil test all fields to which nutrients (commercial fertilizer or manure) will be applied that year. Soil samples must be pulled by an ISDA certified soil sampler. If nutrients are not applied to a field, a test will not be required that year. Soil tests will however, be required prior to any future nutrient application. These soil tests should be taken from 0-12 inches and should be used to develop the annual nutrient budget for each field.
  - Fields classified as surface water concerns will be tested annually at 0-12" soil depth. The phosphorus threshold for surface water concerns are 40 parts per million (ppm). In the event phosphorus tests exceed 40 ppm, the producer shall not apply phosphorus (commercial fertilizer or manure) in excess of the estimated annual crop phosphorus uptake.
  - Fields classified as groundwater concerns will be tested at a minimum of every five years at 18-24" soil depth. The phosphorus threshold for groundwater concerns is 20 or 30 ppm (depending on soil depth). In the event phosphorus tests exceed 20 or 30 ppm, the producer shall not apply phosphorus (commercial fertilizer or manure) in excess of the estimated annual crop phosphorus uptake.
- **Nutrient Applications (manure and chemical fertilizer):** Include the following:
  - Nutrient Type
  - Date
  - Amount
  - Application Method
- **Exported Manure:** Records should include the following:
  - Name & Contact Information of Person Receiving the Manure
  - Type & Quantity of the Manure
  - Date Manure was Exported

Submitting an accurate Dairy Environmental Management Plan/ Nutrient Management Plan (EMP/NMP) is the responsibility of Certified EMP/NMP planners and producers. The Idaho State Department of Agriculture (ISDA) is not responsible for any errors identified or not identified in the approval process. A Certified EMP/NMP planner's certification may be revoked if they submit EMPs that contain falsified or materially inaccurate information or fail to meet the requirements of the rules governing nutrient management. IDAPA 02.04.30.190. Producers must

work directly with their Certified EMP/NMP planner to ensure that lagoons are sized, constructed, and maintained correctly; nutrients are applied appropriately; crop rotations are accurate; and all other EMP/NMP requirements are met.

Lagoon management is a key component to appropriately implementing an EMP/NMP. Proper maintenance will ensure the integrity of lagoons. It is important to remove accumulated solids and wastewater upon entering into the wet season, to ensure that the lagoon has the required storage capacity required for the minimum 180 day storage period.

Producers must ensure that nutrients are applied appropriately on a case-by-case basis. Producers must make facility specific adjustments and monitor and manage waste containment sizing, land application timing, and the amount of nutrient application. If followed, EMP/NMPs are a tool designed to provide an estimate and not a guarantee that desired outcomes will be reached. A producer should monitor and make land application adjustments based on soil sample results and other available site specific information and not simply rely on the EMP/NMP estimates for application of nitrogen, phosphorus, and potassium to crops.

The crop information is based on a projection of the facility's farming practices. A crop rotation is designed to create a nutrient budget which will allow the producer to plan manure application on a yearly basis. A change in crop rotation will change the nutrient budget and may change the amount of nutrients that can be applied based on crop uptake values.

The EMP/NMP is based on information provided by the operator of the facility working with their certified EMP/NMP planner. Lagoon capacity, animal numbers, solid waste and compost storage capacity must accurately reflect the operation at the time the EMP/NMP was submitted for approval or precisely explain any planned expansion that the EMP/NMP was designed to account for. The owner/operator of the facility is responsible for the accuracy of all information provided and informing the ISDA of any significant changes to the operation. If the facility exceeds the county CAFO Permit for animal numbers or expands or intends to expand waste containment facilities it is the owner/operator of the facility's responsibility to inform the appropriate county authority. The EMP/NMP must be kept up to date and reflect the current operation of the facility.

## Manure Application Rate Requirement By Year

This NMP has been developed using the Narrative Rate Approach. The farms planned or typical crop rotations are listed at the end of this plan and will typically be used. The order of crops grown may change from field to field and from year to year. Alternative crops may be grown and the possible alternatives are shown in the crop rotation section of the plan.

Timing and method of nutrient application shall correspond as closely as possible with plant nutrient uptake timing, while considering cropping system limitations, weather and climatic conditions, risk analysis and field accessibility. Application methods to reduce the risk of nutrient transport to surface and ground water or into the atmosphere shall be employed.

Manure nutrient concentration is determined from manure testing. Manure testing was done on several manure streams applied on the farm in 2017. The following table shows the manure streams sampled and the concentration of nutrients within those streams.

**Table A-3 - Manure Testing**

Testing Liquids	N ppm	P ppm	K ppm	P2O5 ppm	K2O ppm	Moisture	N*1 Avail. Rate
B1 Lagoon 2	234	699	5333	1601	6400	99.6%	40%
B2 Lagoon 2	272	1310	5916	3000	7099	99.6%	40%
B3 Pond 4	349	611	4833	1399	5800	99.4%	40%
B4 Pond 4	176	393	4583	900	5500	99.1%	40%
Testing Solids	N ppm	P ppm	K ppm	P2O5 ppm	K2O ppm	Moisture	
Open Lot corrals	10100	5808	19583	13300	23500	66.4%	30%
0	0	0	0	0	0	0.0%	30%

\*1 N Avail. Rate is the % of applied nitrogen expected to be available to the crop in the first year. Applications in successive years will increase manure N availability over time and should be accounted for.

Using the above concentrations the following table A-4 was developed to show the amount of nutrients to be expected in various volumes and moisture contents of the waste streams to be land applied.

**Table A-4 - Manure Testing Calculations**

<b>B1 Lagoon 2 Calculations</b>	<b>Nutrients Applied Testing</b>			<b>Available<sup>*1</sup> N-lbs</b>
	<b>N - lbs</b>	<b>P2O5 lbs</b>	<b>K2O lbs</b>	
1000 gallons	2.0	13.3	53.4	0.8
1/2 acre inch	26.5	181.3	724.6	10.6
1 acre inch	53.0	362.5	1449.3	21.2
Diluted to 10% acre inch	5.3	36.3	144.9	2.1
<b>B2 Lagoon 2</b>				
1000 gallons	2.3	25.0	59.2	0.9
1/2 acre inch	30.8	339.7	803.9	12.3
1 acre inch	61.6	679.4	1607.7	24.6
Diluted to 10% acre inch	6.2	67.9	160.8	2.5
<b>B3 Pond 4</b>				
1000 gallons	2.9	11.7	48.4	1.2
1/2 acre inch	39.5	158.4	656.7	15.8
1 acre inch	79.0	316.9	1313.4	31.6
Diluted to 10% acre inch	7.9	31.7	131.3	3.2
<b>B4 Pond 4</b>				
1000 gallons	1.5	7.5	45.9	0.6
1/2 acre inch	19.9	101.9	622.7	8.0
1 acre inch	39.9	203.8	1245.5	15.9
Diluted to 10% acre inch	4.0	20.4	124.5	1.6
<b>Open Lot corrals Calculation</b>	<b>N - lbs</b>	<b>P2O5 lbs</b>	<b>K2O lbs</b>	
Per ton @ 66.4% moisture	20.2	26.6	47.0	6.1
Per 10 Ton Load	202.0	266.0	470.0	60.6
Per 15 Ton Load	303.0	399.0	705.0	90.9
<b>0 Calcs.</b>	<b>N - lbs</b>	<b>P2O5 lbs</b>	<b>K2O lbs</b>	
Per ton @ 0% moisture	0.0	0.0	0.0	0.0
Per 10 ton load 65% moisture	0.0	0.0	0.0	0.0
Per 15 ton load 65% moisture	0.0	0.0	0.0	0.0

<sup>\*1</sup> Available N is the amount of nitrogen expected to be available to crop the year its applied

Based on the above table, a ton of solid manure at 65% moisture will provide 26.6 lbs of P2O5. Application rates will be determined based on individual field rotations and past manure applications. Where possible application rates will be based on actual manure testing.

Application rates for all fields with soil tests at or above 40 ppm ortho Phosphorous in the top foot shall be applied at crop uptake. Banking of phosphorous is allowable as long as nitrogen needs of crops are not exceeded.

The following table shows the volumes of manure or lagoon water that can be applied based on the above testing to the proposed crops that will be predominately grown.

Table A-5a1 - B1 Lagoon 2 Application Rates

		Crop P2O5 Uptake Rates					100%
Crop	N Avail	in/ acre	Total	lbs/acre			%N Uptake
	Rate		N - lbs	Avail. N	P2O5	K2O	
Alfalfa	40%	0.2	12	5	85	339	1%
Corn silage	40%	0.4	21	9	145	581	4%
triticale	40%	0.4	20	8	140	560	2%
Barley	40%	0.1	5	2	36	145	2%
Pasture	40%	0.1	7	3	46	186	2%
Potatoes	40%	0.1	8	3	52	208	2%
wheat	40%	0.2	9	4	63	253	3%

Table A-5b - Open Lot corrals Application Rates

		Crop P2O5 Uptake Rates					100%
Crop	N Avail	Tons/ acre	Total	lbs/acre			%N Uptake
	Rate		N - lbs	Avail. N	P2O5	K2O	
Alfalfa	30%	3.2	64	19	85	150	5%
Corn silage	30%	5.5	110	33	145	257	15%
triticale	30%	5.3	106	32	140	248	7%
Barley	30%	1.4	28	8	36	64	8%
Pasture	30%	1.7	35	11	46	82	8%
Potatoes	30%	2.0	40	12	52	92	8%
wheat	30%	2.4	48	14	63	112	10%

Table A-5a3 - B2 Lagoon 2 Application Rates

		Crop P2O5 Uptake Rates					100%
Crop	N Avail	in/	Total	lbs/acre			%N Uptake
	Rate	acre	N - lbs	Avail. N	P2O5	K2O	
Alfalfa	40%	0.2	14	6	159	377	1%
Corn silage	40%	0.4	25	10	273	645	5%
triticale	40%	0.4	24	10	263	622	2%
Barley	40%	0.1	6	2	68	161	2%
Pasture	40%	0.1	8	3	87	206	2%
Potatoes	40%	0.1	9	4	98	231	2%
wheat	40%	0.2	11	4	119	281	3%

Table A-5a4 - B3 Pond 4 Application Rates

		Crop P2O5 Uptake Rates					100%
Crop	N Avail	in/ acre	Total	lbs/acre			%N Uptake
	Rate		N - lbs	Avail. N	P2O5	K2O	
Alfalfa	40%	0.3	21	8	85	352	2%
Corn silage	40%	0.5	36	15	94	572	7%
triticale	40%	0.4	35	14	90	551	3%
Barley	40%	0.1	9	4	23	143	3%
Pasture	40%	0.1	12	5	30	182	3%
Potatoes	40%	0.2	13	5	33	205	4%
wheat	40%	0.2	16	6	41	249	4%

**Table A-5a5 - B4 Pond 4 Application Rates**

		Crop P2O5 Uptake Rates					100%
Crop	N Avail	in/ acre	Total	lbs/acre			%N Uptake
	Rate		N - lbs	Avail. N	P2O5	K2O	
Alfalfa	40%	0.4	17	7	85	519	2%
Corn silage	40%	0.7	28	11	145	889	5%
triticale	40%	0.7	27	11	140	856	2%
Barley	40%	0.2	7	3	36	222	3%
Pasture	40%	0.2	9	4	46	284	3%
Potatoes	40%	0.3	10	4	52	318	3%
wheat	40%	0.3	12	5	63	387	3%

The tables above show the amount of manure that can be applied to cropped fields to match crop phosphorous uptake levels based on manure testing. Lagoon applications should closely match those rates for yearly crop uptake. Solid manure applications can be made at higher levels and resting the field which will bank phosphorous and then all future years to utilize those phosphorous applications. Based on the table above a corn crop will utilize 5.5 tons of manure a year at the crop uptake rate of P2O5. Since it is difficult to apply at this level banking can be used to apply 2 or more years of phosphorous to a field to reduce the frequency of application to a field and the impacts of vehicle traffic and compaction to the soils. One item of note is that this solid sample was from open lot manure and not compost. Currently the facility is predominately converting all the open lot corral manure to compost for export or application. It is recommended to sample compost that is finished before land application to best determine the nutrient content of the compost.

### Minimum Acres Required for Manure Application

Manure Group	Acres
Solid Stack(s)	16470
Waste Storage Pond(s)	256

The acreage in the table is based on an average crop uptake of 100 lbs P<sub>2</sub>O<sub>5</sub> per acre. These acreage numbers are for estimating export acreage needed.

### Third Party Export

Name	Address	Phone Number	Acres Available for Manure Application	Address of 3 <sup>rd</sup> Party Acreage
Fred Stechlin	141 W 620 N,Shoshone,ID,83352	(b) (6)	156	
Gary Jerome	874 4 Mile Rd,Shoshone,ID,83352		110	
Craig Hansen	212 E 620 N,Shoshone,ID,83352		100	
Silent T Ranch	420 N 700 W,Shoshone,ID,83352		200	
Ted Lennon	770 N 150 W,Shoshone,ID,83352		350	
V&C Ranch LLC	455 4 Mile Rd,Shoshone,ID,83352		90	
Carl Pendelton	50 W 620 N,Shoshone,ID,83352		525	
Alex Bilbao	893 4 Mile Rd,Shoshone,ID,83352		550	
Paul Jerome	34 E 420 N,Shoshone,ID,83352		160	
Paul Sluder	796 W 520 N,Shoshone,ID,83352		80	
Desert's Edge Angus	558 N 200 W,Shoshone,ID,83352		640	
Eden Farms	414 N 800 W,Gooding,ID,83330		900	
Sabala Farms	1819 E 1550 S,Gooding,ID,83330		930	
Craig Olsen	215 Montana St,Gooding,ID,83330		350	
Tunapa Ranch	2490 E 1700 S,Gooding,ID,83330		407	
Big Wood Farms	P.O Box 741,Shoshone,ID,83352		1000	
Glen Davis	800 W 720 N,Shoshone,ID,83352		80	
Randy Lowry	521 N 650 W,Shoshone,ID,83352		30	
Braun Farms	2359 E 1375 S,Gooding,ID,83330		200	
Chris Arratte	106 E 420		560	

	N,Shoshone,ID,83352			
Steve & Wendy Mohr	503 W 470 N,Shoshone,ID,83352	(b) (6)	60	
Brent Williams	583 W 720 N,Shoshone,ID,83352		240	
Bill Murphy	620 N 488 W,Shoshone,ID,83352		120	
The Windy H	762 W 620 N,Shoshone,ID,83352		130	
Hi Line Farms Inc.	548 N 680 W,Shoshone,ID,83352		350	
Magic Valley Compost	76 N 400 W,Jerome,ID,83338		6311	
Craig Hadden	300 E 600 N,Shoshone,ID,83352		600	
Glanbia Richfield	,Richfield,ID,		600	
Dean Techannen	,Shoshone,ID,83352		200	
Bryan Barney	284 West 420 N,Shoshone,ID,83352		20	
Larry Barney	750 W 738 N,Shoshone,ID,83352	(b) (6)	153	

## **Four Brothers Dairy**

### **ANALYSIS OF RESOURCE CONCERNS**

#### **INTRODUCTION**

The purpose of this nutrient management plan is to meet agricultural production goals and to certify that manure and nutrients are properly managed to minimize adverse impact to surface or groundwater. Plans are written in cooperation with the producer to:

- 1) Assure proper containment of animal manure and process waste water.
- 2) Assess resource concerns which exist on the property.
- 3) Budget nutrient sources to optimize crop water and nutrient needs. Nutrient sources include commercial fertilizers, animal manure, mineralization of previous crop soil organic matter, accounting of residues, and irrigation water.
- 4) When applicable, assess irrigation water management to minimize movement of nutrients beyond the root zone or with runoff.

If animal manure and/or commercial fertilizers are not properly managed, contaminants may negatively impact surface and/or groundwater. Some water resource contaminants associated with poorly managed animal manure and fertilizers are:

**Phosphorus** in the soil readily adsorbs to soil particles; thus, erosion of soil by surface runoff is the general mode of phosphorus transport. Even at very low concentrations, phosphorus can result in plant and algae blooms in surface water bodies. Alga blooms are a nuisance to boaters, irrigators, and others. Toxins released by certain algae can be lethal to livestock or other animals that drink the water. Dissolved oxygen in the water is depleted as algae die and decompose, sometimes causing fish kills.

**Nitrogen** in the form of nitrate ( $\text{NO}_3^-$ ) is highly water-soluble and will move with water, particularly down the soil profile past the root zone if not utilized by plants (thus becoming a groundwater contamination issue). Nitrates are toxic to infants under 6 months, and to livestock at high concentrations. In surface water, excess nitrogen, like phosphorus, can result in nuisance plant and algae growth.

**Organic matter** in high load decreases dissolved oxygen in a surface water body when it decomposes. Low levels of dissolved oxygen is harmful or even fatal to fish and other aquatic life.

**Bacteria** and microorganism illnesses (pathogens) potentially transmitted through water by animal manure include Giardia, Typhoid Fever, Cryptosporidium, and Cholera. Pathogens from animal waste can negatively impact surface and groundwater quality.

## FACILITY DESCRIPTION

### Owner Information

Owner (1): **Andy, Jerome, Clem, Lawrence Fitzgerald**

Address: , ,

Phone:

### Location

Site Map: Facility site plan illustrated in Figure 1

Soil Conservation

District: **Gooding, Wood River**

County: **Gooding, Lincoln**

Watershed Basin: **Big Wood, Little Wood** (USGS Hydrologic Unit Code #  
**17040219, 17040221**)

## ANALYSIS OF RESOURCE CONCERNS

### Farm Resource Concerns

**Four Brothers Dairy** is located in a watershed containing water quality limited stream segments listed according to the Clean Water Act. Stream segments are listed because a water quality parameter prevents the attainment of the "Fishable/Swimmable" goal of the Clean Water Act.

WATERBODY	BOUNDARIES	BACT	CHAN STAB	DO	FLOW ALT	HAB ALT	MET HG	MET	NH3	NUTR	O_G	ORG	PEST	PH	SAL	SED	TDG	TEMP	UNKN	*
Big Wood River	Highway 75 to Little Wood River	1	0	1	1	0	0	0	1	1	0	0	0	0	0	1	0	0	0	<input type="checkbox"/>

**Four Brothers Dairy** is located in a critical Nitrate-Nitrogen management area **Wood River, Priority 2**. Nitrate Management Areas are designated based upon ground water quality sampling results. Two priority groups exist as follows:

Priority 1 is designated because at least 25% of the ground water sampling locations within the area exceed 5-milligrams/liter nitrate. This is one-half of the maximum contaminant level of 10-milligrams/liter nitrate. This nitrate concentration is considered evidence of significant degradation. Public drinking water systems are required to increase monitoring frequency when this level is reached.

Priority 2 is designated because at least 50% of the ground water sampling locations within the area exceed 2-milligrams/liter nitrate. This concentration threshold provides an indication of human-caused (anthropogenic) impacts. The upper limit for naturally occurring (background) concentrations of nitrate is considered to be about 2 mg/l.

**Four Brothers Dairy** is located in a sole source aquifer area - Eastern Snake River Plain Aquifer.

#### Field Resource Concerns

- **No Resource Concerns** -

#### Depth Limiting Subsurface Features

Field Name	Subsurface Feature	Depth from Surface (in)
<b>1/2 North Pivot</b>	Hard Pan	20
	Fractured Bedrock	10
	Water Table	>72
<b>Adams East</b>	Hard Pan	20
	Fractured Bedrock	40
	Water Table	>72
<b>Adams West</b>	Hard Pan	20
	Fractured Bedrock	40
	Water Table	>72
<b>Buckway</b>	Hard Pan	40
	Fractured Bedrock	25
	Water Table	>72
<b>Corner Pivot</b>	Cobbles	23
	Fractured Bedrock	12
	Water Table	>72
<b>DFull</b>	Fractured Bedrock	12
	Water Table	>72
<b>DSwing</b>	Fractured Bedrock	21
	Water Table	>72
<b>East</b>	Hard Pan	20
	Fractured Bedrock	13
	Water Table	>72
<b>East 1/2 Swing</b>	Hard Pan	20
	Fractured Bedrock	21
	Water Table	>72
<b>Gardner</b>	Hard Pan	40
	Fractured Bedrock	25
	Water Table	>72
<b>German E</b>	Hard Pan	40
	Fractured Bedrock	25
	Water Table	>72
<b>German S</b>	Hard Pan	40

	Fractured Bedrock	25
	Water Table	>72
<b>German W</b>	Hard Pan	40
	Fractured Bedrock	25
	Water Table	>72
<b>Grange</b>	Hard Pan	40
	Fractured Bedrock	25
	Water Table	>72
<b>Guthrie</b>	Hard Pan	40
	Fractured Bedrock	25
	Water Table	>72
<b>Hall</b>	Hard Pan	40
	Fractured Bedrock	25
	Water Table	>72
<b>Heitman</b>	Hard Pan	20
	Fractured Bedrock	21
	Water Table	>72
<b>Helsley</b>	Hard Pan	40
	Fractured Bedrock	25
	Water Table	>72
<b>Hubbs</b>	Hard Pan	20
	Fractured Bedrock	21
	Water Table	>72
<b>Jones</b>	Hard Pan	40
	Fractured Bedrock	25
	Water Table	>72
<b>Kelly</b>	Hard Pan	40
	Fractured Bedrock	25
	Water Table	>72
<b>Middle Hand Lines</b>	Cobbles	23
	Fractured Bedrock	12
	Water Table	>72
<b>NE Pivot</b>	Cobbles	23
	Fractured Bedrock	26
	Water Table	>72
<b>NFull</b>	Hard Pan	20
	Fractured Bedrock	10
	Water Table	>72
<b>North Mini</b>	Hard Pan	40
	Fractured Bedrock	41

	Water Table	>72
<b>NW Pivot</b>	Cobbles	23
	Fractured Bedrock	40
	Water Table	>72
<b>Pantone</b>	Hard Pan	40
	Fractured Bedrock	25
	Water Table	>72
<b>Race</b>	Hard Pan	20
	Fractured Bedrock	21
	Water Table	>72
<b>Railroad Pivot</b>	Cobbles	23
	Fractured Bedrock	12
	Water Table	>72
<b>Rienstra</b>	Hard Pan	20
	Fractured Bedrock	21
	Water Table	>72
<b>Saint</b>	Hard Pan	20
	Fractured Bedrock	21
	Water Table	>72
<b>Sandy N</b>	Hard Pan	40
	Fractured Bedrock	25
	Water Table	>72
<b>Sandy S</b>	Cobbles	23
	Fractured Bedrock	25
	Water Table	>72
<b>SE Pivot</b>	Cobbles	23
	Fractured Bedrock	12
	Water Table	>72
<b>SE Swing Pivot</b>	Fractured Bedrock	21
	Water Table	>72
<b>Sherman</b>	Hard Pan	40
	Fractured Bedrock	25
	Water Table	>72
<b>Silva E</b>	Hard Pan	40
	Fractured Bedrock	25
	Water Table	>72
<b>Silva Handlines</b>	Hard Pan	40
	Fractured Bedrock	25
	Water Table	>72
<b>Silva S</b>	Fractured Bedrock	6

	Water Table	>72
<b>Silva W</b>	Hard Pan	40
	Fractured Bedrock	25
	Water Table	>72
<b>South Swing</b>	Cobbles	23
	Hard Pan	20
	Fractured Bedrock	10
	Water Table	>72
<b>SW Pivot</b>	Cobbles	23
	Fractured Bedrock	40
	Water Table	>72
<b>Villalobos</b>	Hard Pan	40
	Fractured Bedrock	25
	Water Table	>72

#### **Well Testing Results** (See back of page):

Well	Date	Hardness	EC	PH	K	Nitrates	Nitrites	NH3	Na	Carbonate	Bicarbonate
No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data	No Data

### **ISDA REGULATIONS AND THE IDAHO NUTRIENT MANAGEMENT STANDARD**

Nutrient management plans for animal agricultural operations regulated by the Idaho State Department of Agriculture (ISDA) must be approved by the Idaho State Department of Agriculture and must follow the Natural Resource Conservation Service (NRCS) Agriculture Waste Management Field Handbook and the Idaho Nutrient Management Standard. ISDA regulation and the Standard use soil test phosphorus as the indicator for environmental impact from agricultural production practices. The Idaho Nutrient Management Standard is based on a threshold soil test phosphorus level (TH), above which there is no agronomic advantage to application of phosphorus.

The Idaho Nutrient Management Standard categorizes fields as a surface water concern or a groundwater concern. A surface water concern indicates that runoff leaves the contiguous operating unit from normal storm events, rain on snow, frozen ground, or irrigation. The soil phosphorus threshold for a field with a surface water concern is 40 ppm phosphorus for basic soils (pH > 7) tested with the Olsen method; 60 ppm phosphorus for acidic soils (pH < 7) tested with the Bray method; and 6 ppm phosphorus for acidic soils tested with the Morgan method (0-12" Soil Sample Depth).

A groundwater resource concern indicates that runoff does not leave the contiguous operating unit from normal storm events, rain on snow, frozen ground, or irrigation. There are two sub-categories for fields identified as having a groundwater concern. The first category applies to fields with a resource concern within the first five feet of the soil profile. A resource concern could be shallow soils, gravel, cobble, bedrock, high groundwater table, or a drained field. These

fields are indicated as a groundwater concern <5'. The soil phosphorus threshold for a field with a groundwater concern <5' is 20 ppm phosphorus for soils tested with the Olsen method; 25 ppm phosphorus for soils tested with the Bray method and 2.5ppm phosphorus for soils tested with the Morgan method (18-24" Soil Sample Depth).

If a field is not classified as having a surface water concern or a groundwater <5' concern, by default it is classified as having a groundwater concern >5'. The soil phosphorus threshold for a field with a groundwater concern >5' is 30 ppm phosphorus for soils tested with the Olsen method; 45 ppm phosphorus for soils tested with the Bray method; and 4.5 ppm phosphorus for soils tested with the Morgan method (18-247" Soil Sample Depth).

### Field Phosphorus Threshold

Field	Resource Concern	P Threshold (ppm)	P Threshold Soil Test Depth
1/2 North Pivot	Surface Water	40	0 - 12"
Adams East	Surface Water	40	0 - 12"
Adams West	Surface Water	40	0 - 12"
Buckway	Surface Water	40	0 - 12"
Corner Pivot	Surface Water	40	0 - 12"
DFull	Surface Water	40	0 - 12"
DSwing	Surface Water	40	0 - 12"
East	Surface Water	40	0 - 12"
East 1/2 Swing	Surface Water	40	0 - 12"
Gardner	Surface Water	40	0 - 12"
German E	Surface Water	40	0 - 12"
German S	Surface Water	40	0 - 12"
German W	Surface Water	40	0 - 12"
Grange	Surface Water	40	0 - 12"
Guthrie	Surface Water	40	0 - 12"
Hall	Surface Water	40	0 - 12"
Heitman	Surface Water	40	0 - 12"
Helsley	Surface Water	40	0 - 12"
Hubbs	Surface Water	40	0 - 12"
Jones	Surface Water	40	0 - 12"
Kelly	Surface Water	40	0 - 12"
Middle Hand Lines	Surface Water	40	0 - 12"
NE Pivot	Surface Water	40	0 - 12"
NFull	Surface Water	40	0 - 12"
North Mini	Surface Water	40	0 - 12"
NW Pivot	Surface Water	40	0 - 12"

Pantone	Surface Water	40	0 - 12"
Race	Surface Water	40	0 - 12"
Railroad Pivot	Surface Water	40	0 - 12"
Rienstra	Surface Water	40	0 - 12"
Saint	Surface Water	40	0 - 12"
Sandy N	Surface Water	40	0 - 12"
Sandy S	Surface Water	40	0 - 12"
SE Pivot	Surface Water	40	0 - 12"
SE Swing Pivot	Surface Water	40	0 - 12"
Sherman	Surface Water	40	0 - 12"
Silva E	Surface Water	40	0 - 12"
Silva Handlines	Surface Water	40	0 - 12"
Silva S	Surface Water	40	0 - 12"
Silva W	Surface Water	40	0 - 12"
South Swing	Surface Water	40	0 - 12"
SW Pivot	Surface Water	40	0 - 12"
Villalobos	Surface Water	40	0 - 12"

## Manure Application Rate Requirement By Year

This NMP has been developed using the Narrative Rate Approach. The crop rotations are detailed in the crop analysis section of this plan. The crop rotations will be used, but the order of the crops from year to year may change. Alternative crops may also be grown. Rotational nutrient needs for crops will be adjusted as and if the rotations change from year to year.

Timing and method of nutrient application shall correspond as closely as possible with plant nutrient uptake timing, while considering cropping system limitations, weather and climatic conditions, risk analysis and field accessibility. Application methods to reduce the risk of nutrient transport to surface and ground water or into the atmosphere shall be employed.

Application rates are set at the average crop uptake rate of phosphorus for the crop rotation. Ideally, fields with high phosphorus levels would have no or reduced levels of nutrients applied some years until the levels come down.

Manure will be applied in the form of solid stack manure or composted manure. The following table shows the amount of nutrients that can be expected to be found in manure sources on the farm. This table was developed using one plan nutrient production info and then calculated into the most typical application rates and moisture contents. Moisture content of manure can drastically change the amount of nutrients contained in each unit or ton of manure. These numbers can be adjusted for moisture content.

Manure sampling is recommended each year until a pattern is established to base manure applications onto the farm.

	Nutrients Applied One Plan		
Lagoon Calculations	N - lbs	P2O5 lbs	K2O lbs
1000 gallons	0.47	0.81	1.38
1/2 acre inch	6.34	11.05	18.76
1 acre inch	12.68	22.10	37.51
Diluted to 10% acre inch	1.27	2.21	3.75
Solid Manure Calculations	N - lbs	P2O5 lbs	K2O lbs
Per wet ton 88% moisture	3.81	4.19	7.06
Per ton 65% moisture	14.3	15.7	26.5
Per 10 ton load	143	157	265
Per 15 ton load	214	236	397
Compost 50% mois. per ton	15.9	17.4	29.4
Compost 10 ton load	159	174	294

# ANNUAL NUTRIENT BUDGET

The following crop nutrient budget is based on soil test data and cropping information. It is for one year for the following field and specified crop information:

## Nutrient Budget Summary

Field: Crop: Corn, Field, Silage Yield: 28

	N	P205	K20
<b>Crop Nutrient Uptake</b>	206	71	209
<b>Crop Nutrient Requirement</b>	250	71	209
Nutrients From Soil	?		
from Mineralized Nitrogen	0		
from Prior Crops	-10		
from Prior Bio-Nutrients	16		
from Irrigation Water	0		0
<b>Nutrient Balance from above *</b>	243.7	71	209.1
Solid Stack(s)	39	96	162
<b>Estimated Remaining Nutrients Required *</b>	205	-25	47
<b>Commercial Fertilizer Application</b>	0	0	0
<b>Final Nutrient Balance *</b>	205	-25	47

\* Positive values indicate additional nutrients are required; negative values indicate a nutrient surplus

Field: Crop: Alfalfa, Hay, S Yield: 7

	N	P205	K20
<b>Crop Nutrient Uptake</b>	351	72	267
<b>Crop Nutrient Requirement</b>	351	72	267
Nutrients From Soil	?		
from Mineralized Nitrogen	0		
from Prior Crops	-15		
from Prior Bio-Nutrients	16		
from Irrigation Water	0		0
<b>Nutrient Balance from above *</b>	349.8	71.9	266.9
Solid Stack(s)	0	0	0
<b>Estimated Remaining Nutrients Required *</b>	350	72	267
<b>Commercial Fertilizer Application</b>	0	0	0
<b>Final Nutrient Balance *</b>	350	72	267

\* Positive values indicate additional nutrients are required; negative values indicate a nutrient surplus

**Field:** **Crop:** Alfalfa, Hay, S **Yield:** 7

	N	P205	K20
<b>Crop Nutrient Uptake</b>	351	72	267
<b>Crop Nutrient Requirement</b>	351	72	267
Nutrients From Soil	?		
from Mineralized Nitrogen	0		
from Prior Crops	-15		
from Prior Bio-Nutrients	16		
from Irrigation Water	0		0
<b>Nutrient Balance from above *</b>	349.8	71.9	266.9
Solid Stack(s)	0	0	0
<b>Estimated Remaining Nutrients Required *</b>	350	72	267
<b>Commercial Fertilizer Application</b>	0	0	0
<b>Final Nutrient Balance *</b>	350	72	267

\* Positive values indicate additional nutrients are required; negative values indicate a nutrient surplus

**Field:** **Crop:** Corn, Field, Silage **Yield:** 28

	N	P205	K20
<b>Crop Nutrient Uptake</b>	206	71	209
<b>Crop Nutrient Requirement</b>	250	71	209
Nutrients From Soil	?		
from Mineralized Nitrogen	0		
from Prior Crops	53		
from Prior Bio-Nutrients	0		
from Irrigation Water	0		0
<b>Nutrient Balance from above *</b>	197	71	209.1
Solid Stack(s)	39	96	162
<b>Estimated Remaining Nutrients Required *</b>	158	-25	47
<b>Commercial Fertilizer Application</b>	0	0	0
<b>Final Nutrient Balance *</b>	158	-25	47

\* Positive values indicate additional nutrients are required; negative values indicate a nutrient surplus

# ANALYSIS OF ANIMAL SYSTEM

## WASTE STORAGE AND HANDLING

### Livestock Unit Waste Characteristics

Description	Animal	Number	Average Animal Weight	Days Collected	Housing	Bedding Type	Bedding (tons)	Waste (tons)
Milking Barn 1	Dairy - Lactating Cow (80 lb/d milk avg)	1,750	1,300	365	Open Lot	Long Straw	3,310	39,197
Milking Barn 2	Dairy - Lactating Cow (80 lb/d milk avg)	1,000	1,300	365	Open Lot	Long Straw	2,206	26,131
Milking Barn 3	Dairy - Lactating Cow (80 lb/d milk avg)	2,750	1,300	365	Open Lot	Long Straw	6,068	71,861
Milking Barn 4	Dairy - Lactating Cow (80 lb/d milk avg)	2,750	1,300	365	Open Lot	Long Straw	6,068	71,861
Milking Barn 5	Dairy - Lactating Cow (80 lb/d milk avg)	2,000	1,300	365	Open Lot	Long Straw	4,413	52,262
Dry Cows	Dairy - Dry Cow	1,712	1,300	365	Open Lot	Long Straw	3,089	16,936
Replacement Bulls	Beef - High forage diet	228	650	365	Open Lot	Long Straw	252	2,814
Breeding Bulls	Beef - High forage diet	228	1,500	365	Open Lot	Long Straw	580	6,494
Calves	Dairy - Calf	1,170	330	365	Crates	Long Straw	352	5,844
Weaned Calves	Dairy - Calf	1,170	330	365	Covered Shed	Long Straw	381	5,844
Open Heifers	Dairy - Heifer	2,796	970	365	Open Lot	Long Straw	4,603	27,708

Bred Heifers	Dairy - Heifer	3,567	970	365	Open Lot	Long Straw	5,872	35,348
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### Manure/Biosolid Groups

Manure Group	Storage Type	Application Method	Days to Incorporation	Nitrogen Retention(%)	Annual Volume (ft3)	Annual Weight (tons)
Solid Stack(s)	Manure Stored in Open Lot, Arid Region	Broadcast, Incorporated deeper than 3 inches	>7 days	42	12,427,325	393,325
Waste Storage Pond(s)	Waste Storage Pond, Diluted > 50%	Irrigation	N/A	26	241,497	7,643

\* in Nitrogen Retention % Column means "Overridden Nitrogen Values"

Assisted Mode has been turned off.

Manure Group		Bred Heifers	Breeding Bulls	Calves	Dry Cows	Milking Barn 1	Milking Barn 2	Milking Barn 3	Milking Barn 4	Milking Barn 5	Open Heifers	Replacement Bulls	Weaned Calves
Waste Storage Pond(s)	% To Group	N/A				5	5	5	5	5			
Solid Stack(s)	% To Group	100	100	100	100	95	95	95	95	95	100	100	100

### Annual Production of Nutrients

The nutrient values were calculated based on animal weight and nitrogen loss estimates as described in the NRCS Agricultural Waste Management Field Handbook guidelines (1996). The calculations are estimates, and manure testing is recommended for more accuracy, as manure nutrient content varies widely among operations.

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### Comments on Bionutrients

All dairy barns are open lot facilities.

## Dairy/Process Water Values

The dairy process water estimates are summarized in the producer summary. Detailed descriptions are found in Appendix R. The bulk tank sizes are shown in the producer summary under the parlor descriptions.

Total Annual Solid Capacity		
Bio-Nutrient Group	Recommended Capacity Cubic Feet	% Contained
Solid Stack(s)	12,427,325	100%
Milking Barn 1	871,839	100%
Milking Barn 2	548,032	100%
Milking Barn 3	1,494,613	100%
Dry Cows	852,871	100%
Replacement Bulls	56,903	100%
Breeding Bulls	130,968	100%
Calves	84,480	100%
Weaned Calves	84,667	100%
Open Heifers	1,039,387	100%
Bred Heifers	1,325,935	100%
Milking Barn 5	1,195,645	100%
Milking Barn 4	1,494,613	100%

<b>Container Name</b>	<b>Volume (ft3)</b>	<b>Storage Period (Days)</b>	<b>Length</b>	<b>Width</b>	<b>Depth</b>	<b>Freeboard</b>	<b>Slope</b>
B1 Separator Pond	35,991	180	225.0	72.0	4	1	3
B1 Lagoon 1	173,115	180	330.0	166.0	4.5	1	2
B1 Lagoon 2	1,252,387	180	423.4	300.0	15	2	2.7
Calf Berm	144,937	180	600.0	250.0	2	1	2
SW Pump Pit	8,661	180	77.0	67.0	4.5	2	2
B2 Settling	47,256	180	200.0	100.0	4	1	3
B2 Lagoon 1	544,920	180	420.0	200.0	8.5	1	2
B2 Lagoon 2	242,222	180	290.0	175.0	6.5	1	2
B2 East 1	706,324	180	391.8	370.0	6.5	1	3
B2 East 2	594,475	180	396.3	286.0	7.1	1	3
B2 East 3	213,624	180	310.5	224.0	4.5	1	3
B2 East 4	77,243	180	332.9	165.0	2.5	1	2
Commod Collect Berm	26,384	180	700.0	36.0	2.5	1	3
B3 Pond 1	234,168	180	512.0	172.0	4	1	3
B3 Pond 2	370,211	180	361.0	172.0	8	1	2
B3 Pond 3	202,929	180	335.0	169.0	5	1	2
B3 Pond 4	564,069	180	420.0	365.0	6	2	2
B3 Old Flush	90,805	180	222.0	120.0	5	1	2
B3 Compost Pond	451,985	180	449.1	280.0	5	1	3
Pen 20 Pond	220,501	180	340.0	180.0	5	1	2
B4 East Sep Cell	49,608	180	316.0	64.0	4	1	2
B4 West Sep Cell	37,572	180	282.0	56.0	4	1	2
B5 North Sep Cell	54,861	180	225.0	95.0	4	1	2
B5 South Sep Cell	213,467	180	475.0	84.0	9	1	2.5
B4 Pond 1	1,003,656	180	677.0	280.0	7	1	3
B4 Pond 2	704,632	180	920.0	400.0	3	1	3
B4 Pond 3	1,603,413	180	780.0	331.0	8	1	3
B4 Pond 4	1,066,812	180	477.0	424.0	8	2	2
Pen 40-1	378,523	180	353.4	300.0	5	1	3
Pen 40-2	226,385	180	254.0	215.0	6	1	3
Pen 40-3	369,700	180	416.0	208.0	6	1	3
Pen 36	368,985	180	479.5	174.0	6.5	1	3.5
B4 Compost Runoff Pond	1,359,818	180	723.2	500.0	5	1	3
Pantone	453,364	180	400.1	260.0	6	1	3
Buckway	838,661	180	393.1	270.0	11	1	3
Andys Pond 1	62,620	180	174.0	67.2	13	1	2.3
Andys Pond 2	564,529	180	318.0	180.0	14	1	2

**Containment of Housing Facility Waste and Corral Runoff**

It is important that water from housing facilities and contaminated runoff from corrals be contained and/or diverted to the lagoon storage system. As stated in the Idaho State Department of Agriculture (ISDA) regulation, a discharge is allowed only under large precipitation events (>25yr, 24hr storm event). Lagoon structures must be properly designed, operated, and maintained to contain all barn wastewater and contaminated runoff from a 25-year, 24-hour rainfall event for the site location and maintained to contain all runoff from accumulation of winter precipitation from a one in five-year winter. Animals confined in the CAFO may not have direct contact with canals, streams, lakes, or other surface waters.

**Comments**

No Comments

## BIO-NUTRIENT EXPORT INFO

Exported Bio-Nutrient Summary					
Bio-Nutrient Group Name	Amount	Consumer	Consumer's Address	Telephone	Acres
Solid Stack(s)	3400	Fred Stechlin	141 W 620 N,Shoshone,ID,83352	(b) (6)	156
Solid Stack(s)	2398	Gary Jerome	874 4 Mile Rd,Shoshone,ID,83352		110
Solid Stack(s)	2180	Craig Hansen	212 E 620 N,Shoshone,ID,83352		100
Solid Stack(s)	4360	Silent T Ranch	420 N 700 W,Shoshone,ID,83352		200
Solid Stack(s)	7630	Ted Lennon	770 N 150 W,Shoshone,ID,83352		350
Solid Stack(s)	1962	V&C Ranch LLC	455 4 Mile Rd,Shoshone,ID,83352		90
Solid Stack(s)	11445	Carl Pendelton	50 W 620 N,Shoshone,ID,83352		525
Solid Stack(s)	11990	Alex Bilbao	893 4 Mile Rd,Shoshone,ID,83352		550
Solid Stack(s)	1308	Bob Short	551 N 250 E,Shoshone,ID,83352		60
Solid Stack(s)	3488	Paul Jerome	34 E 420 N,Shoshone,ID,83352		160
Solid Stack(s)	1744	Paul Sluder	796 W 520 N,Shoshone,ID,83352		80
Solid Stack(s)	13952	Desert's Edge Angus	558 N 200 W,Shoshone,ID,83352		640
Solid Stack(s)	9810	Eden Farms	414 N 800 W,Gooding,ID,83330		900
Solid Stack(s)	20274	Sabala Farms	1819 E 1550 S,Gooding,ID,83330		930
Solid Stack(s)	6540	Craig Olsen	215 Montana St,Gooding,ID,83330		350
Solid Stack(s)	8872.6	Tunapa Ranch	2490 E 1700 S,Gooding,ID,83330		407

Solid Stack(s)	3488	Scott Simmons	830 W 420 N,Gooding,ID,83330	(b) (6)	160
Solid Stack(s)	21800	Big Wood Farms	P.O Box 741,Shoshone,ID,83352		1000
Solid Stack(s)	1744	Glen Davis	800 W 720 N,Shoshone,ID,83352		80
Solid Stack(s)	1199	Harold Knight	482 W County Line Rd,Shoshone,ID,83352		55
Solid Stack(s)	654	Randy Lowry	521 N 650 W,Shoshone,ID,83352		300
Solid Stack(s)	4360	Braun Farms	2359 E 1375 S,Gooding,ID,83330		200
Solid Stack(s)	12208	Chris Arratte	106 E 420 N,Shoshone,ID,83352		560
Solid Stack(s)	1308	Steve & Wendy Mohr	503 W 470 N,Shoshone,ID,83352		60
Solid Stack(s)	5232	Brent Williams	583 W 720 N,Shoshone,ID,83352		240
Solid Stack(s)	2616	Bill Murphy	620 N 488 W,Shoshone,ID,83352		120
Solid Stack(s)	2834	The Windy H	762 W 620 N,Shoshone,ID,83352		130
Solid Stack(s)	7630	Hi Line Farms Inc.	548 N 680 W,Shoshone,ID,83352		350
Solid Stack(s)	140000	Magic Valley Compost	76 N 400 W,Jerome,ID,83338		5500
Solid Stack(s)	13080	Craig Hadden	300 E 600 N,Shoshone,ID,83352		600
Solid Stack(s)	13080	Glanbia Richfield	,Richfield,ID,		600
Solid Stack(s)	4360	Dean Techannen	,Shoshone,ID,83352		200
Solid Stack(s)	436	Bryan Barney	284 West 420 N,Shoshone,ID,83352		20
Solid Stack(s)	335.4	Larry Barney	750 W 738 N,Shoshone,ID,83352	(b) (6)	153

## ANALYSIS OF CROPPING SYSTEM

### Farming Operation

Total Acres: 3065

### Crop Rotations Planned

**THIS IS NOT A FERTILIZER RECOMMENDATION**

#### Crop Rotation Name: Pivot Rotation

Crop	Yield	Yield Units	N Uptake	P <sub>2</sub> O <sub>5</sub> Uptake	K <sub>2</sub> O Uptake
Corn, Field, Silage	28	tons/acre	206.1	112	209.1
Corn, Field, Silage	28	tons/acre	206.1	112	209.1
Corn, Field, Silage	28	tons/acre	206.1	112	209.1
Corn, Field, Silage	28	tons/acre	206.1	112	209.1
Corn, Field, Silage	28	tons/acre	206.1	112	209.1
Corn, Field, Silage	28	tons/acre	206.1	112	209.1
Corn, Field, Silage	28	tons/acre	206.1	112	209.1
Corn, Field, Silage	28	tons/acre	206.1	112	209.1
Alfalfa, Hay, S	7	tons/acre	351.1	70.5	266.9
Alfalfa, Hay, S	7	tons/acre	351.1	70.5	266.9
Alfalfa, Hay, S	7	tons/acre	351.1	70.5	266.9
Alfalfa, Hay, S	7	tons/acre	351.1	70.5	266.9
Average				98	

**THIS IS NOT A FERTILIZER RECOMMENDATION**

#### Crop Rotation Name: Handline Rotation

Crop	Yield	Yield Units	N Uptake	P <sub>2</sub> O <sub>5</sub> Uptake	K <sub>2</sub> O Uptake
Alfalfa, Hay, S	7	tons/acre	351.1	70.5	266.9
Alfalfa, Hay, S	7	tons/acre	351.1	70.5	266.9
Alfalfa, Hay, S	7	tons/acre	351.1	70.5	266.9
Alfalfa, Hay, S	7	tons/acre	351.1	70.5	266.9
Small Grain, Winter, Haylage, Double Cropped	30	tons/acre	278.4	149	515.5
Average				86	

**THIS IS NOT A FERTILIZER RECOMMENDATION**

**Alternate Crops:** Fertilizer Recommendations

Crop	Yield	Yield Units	N Uptake	P <sub>2</sub> O <sub>5</sub> Uptake	K <sub>2</sub> O Uptake
Triticale, Grain	14	tons/acre	229	69	425
Potatoes	400	100 cwt/acre	270	55	249
Barley	108	Bu/acre	150	40	150
Average					

# EMERGENCY ACTION PLAN

Farm Name: Four Brothers Dairy

Date: 9/28/20

## EMERGENCY CONTACTS AND LOCATION OF EQUIPMENT

### Farm Information

Owner/Operator: Andrew, Clem, Lawrence, Fitzgerald

Farm Address: 425 N 250 W, Shoshone, ID 83352

Directions to Farm (from a major highway or road):  
from highway 75 heading north from Shoshone, turn left at 420 North or 4 Mile Road and head west for 2.5 Miles at 250 West at the dairy site.

### Emergency Contacts

- Emergency Farm Contact

Name: Andrew Fitzgerald Phone: (b) (6)

- Fire/Rescue: CALL 911

- County Sheriff: 208-886-2250

- County Emergency Management: 208-886-2452

- Contacts for Emergency Manure Hauling or Clean Up Equipment Needs:

### Check If Safety Equipment Available

☐ Fire Extinguisher(s)

Location: ☐ Home ☐ Farm Office ☐ Barn ☐ Other (specify) \_\_\_\_\_

☐ First Aid Kit(s)

Location: ☐ Home ☐ Farm Office ☐ Barn ☐ Other (specify) \_\_\_\_\_

☐ Hazardous Materials Spill Kit

Location: ☐ Storage Shed ☐ Farm Office ☐ Barn ☐ Other (specify) \_\_\_\_\_

### Information for First Responders

Location(s) of Hazardous or Flammable Materials: \_\_\_\_

Location(s) of Shut-Off Switches for Pumps/Power: \_\_\_\_\_

Has an area been designated for emergency manure storage? ☐ Yes ☐ No  
If yes, location: \_\_\_\_\_

## **EMERGENCY PROCEDURES**

- Personal Injury or Fire

1. Determine the nature of emergency and the type of assistance required. CALL 911.
2. Stabilize any injured persons without moving them, unless it is absolutely necessary to move them out of harm's way.
3. Implement CPR if necessary.
4. In the event of fire, evacuate people and livestock to a safe location.
5. If the fire is small and contained, use a fire extinguisher to put the fire out.
6. Notify emergency personnel of the location of flammables or hazardous materials when they arrive.

- Manure Storage Overflow, Leak or Spill

1. Stop all flow to the storage facility and call emergency farm contact.
2. Determine the extent of incident and what help is needed.
3. Contain the spill/leak/overflow by constructing a temporary dike from soil, corn silage, or other suitable materials, or redirect flow to designated containment/overflow area.
4. If possible, place agitation pump in designated pumping location and load tankers. Land apply manure on fields approved for manure application at rates established by the nutrient management plan.
5. Collect remaining spill and contaminated soil from overflow/leak/spill site and land apply materials on approved fields and approved rates.
6. Complete all necessary clean up and temporary repairs. Contact appropriate authorities, if required, and document the incident and what was done.
7. Conduct engineering analysis of manure storage facility if needed and develop repair plan.

- Manure Spill During Transport or Land Application

1. Stop manure pumps and irrigation equipment and close valves.
2. If there's a road spill, move equipment out of traffic.
3. Call emergency farm contact and determine the extent of incident and what help is needed.
4. Contact the County Sheriff if traffic control is needed.

5. Stop leaks if needed, and contain spill by constructing a temporary berm with soil, straw bales or other available, appropriate materials.
  6. If manure is spilled on the roadway, clean the spill immediately from the road and roadside.
  7. Transfer remaining manure to another tanker/hauler if necessary.
  8. Collect spilled manure and contaminated soil and land apply materials on approved fields at approved rates.
  9. Complete all necessary clean up and make repairs.
  10. Contact appropriate authorities, if required, and document the incident and what was done.
- Accidental Entry to Manure Storage Facility
    1. CALL 911 and advise rescue personnel of the nature and location of the incident.
    2. Locate emergency rescue equipment (ladder, pole, flotation device) and attempt to reach victim.
    3. Do not enter a confined area where gases may accumulate.
    4. Initiate CPR if necessary. Remain with the victim until help arrives.

- Hazardous Materials Spill

1. Keep a spill cleanup kit available at all locations where hazardous materials are handled, transported, or stored because you will not have time to locate all the necessary items before a significant amount of contamination has occurred.
2. Control the spill situation. Confine the spill by absorbing liquids and covering dry materials.
3. Clean the spill and decontaminate the spill site, equipment and protective clothing.
4. Dispose of spill materials using approved methods.
5. If you cannot manage a spill by yourself, get help. Call 911 for immediate response. If the spill is large or particularly hazardous, also contact the Idaho Bureau of Homeland Security at 1-800-632-8000.

- Catastrophic Event

1. In the case of a catastrophic event, all applicable measures above will be implemented.
2. Primary contact is the local emergency response.
3. All efforts will be coordinated within the framework of the Idaho Emergency Operations Plan (<http://www.bhs.idaho.gov/bhslibrary/idahopbasicplan.pdf>).

## Appendix R – Waste System Sizings

# AGTEC Lagoon Design



Producer Information		Facility Info	
Name:	Fitzgerald Brothers	Four Brothers Dairy	
Address:	0	0	
City:	Shoshone	Shoshone	
State:	0	0	
Zip Code:	0	0	
County:	Lincoln	Lincoln	
Project Description: EMP Design for the Process water and area of runoff for Barn 1.			

## Animal Breakdown

Animal Type	# of Animals	Animal Weight (lbs)	Lincoln County LCO #'s	% Total Manure to Lagoon	Total Manure % to Slurry Pond	
Lactating cow	14	1500	1400	0.0	8%	0%
none	0		0	0.0	0%	0%
none	0		0	0.0	0%	0%
none	0		0	0.0	0%	0%
none	0		0	0.0	0%	0%
none	0		0	0.0	0%	0%
none	0		0	0.0	0%	0%
none	0		0	0.0	0%	0%
none	0		0	0.0	0%	0%
	1500	animals	0.0	au's		

## Wash Water Estimates

	Barn 1	0	0	
# Cows milked	1500	0	0	
Stantions/side	20	0	0	
Strings/milking	75.0	0.0	0.0	
Milkings per Day	3	0	0	milkings/day
Cow Prep.	900	0	0	gal/day 3 milkings/day 0.2 gal/cow/milking
Bulk Tank	1800	0	0	gal/day
Pipelines	1500	0	0	gal/day 4 cycles/wash 125 gallons/cycle
Claw Backflush	0	0	0	gal/day 0 gal/cycle 0 cycles/wash
Parlor Hand Washdown	1800	0	0	gal/day 30 gal/min 20 min/milking
Deck Sprays	0	0	0	gal/day 0 gal/min 0 runtime sec 225 cycles/day
Deck Flush	0	0	0	gal/day 0 gal/min 0 min/cycle 0 cycles/day
Holding Pen Flush	0	0	0	gal/day 0 gal/min 0 min/cycle 0 cycles/day
Holding Pen Hand Washdown	1800	0	0	gal/day 30 gal/min 20 min/milking
Sprinkler Pen Water Use	0	0	0	gal/day 0 heads 0 gpm/head 0 min/pen 0 % use
Milk Room Cleaning	300	0	0	gal/day
Water Trough Cleaning	986	0	0	gal/day 20 # of troughs 750 gal/trough 2 #/month
Miscellaneous	0	0	0	gal/day
	9,086	-	-	Total Parlor gal/day
	218,654	-	-	180 Day Volume ft3
Manure from Parlor		281	ft3/day	
Storage period		180	days	Slurry Days of Storage 0
Total Manure from Parlor to Lagoon		102,656	ft3	Slurry Pond Volume ft3 -
Years between Solid sludge Cleanout		5	years	Volume Gal -
Sludge Volume		123,188	ft3	921,443 Gallons



## Recyclable Water Use

	Barn 1	0	0
Milking Parlor Throughput	160	0	0 Cows/hr
Time Milking Per Day	28.1	0.0	0 hours/day
Plate Cooler Water Use	50625	0	0 Gal/day
Water Cooled Compressor	0	0	0 Gal/day
Water Cooled Vacuum Pump	0	0	0 Gal/day
	50625	0	0 Total Cooling Parlor Volume/day in gallons

## Water Use Evaluation

Clean Water Use	50,625 Gal/day
Cow Drinking water use	59,803 Gal/day
Commercial Parlor Use	9,086 Gal/day
Net Excess Cooling Water	0 Gal/day
Yearly Parlor Cooling Volume (amount exceeding that recycled)	0.0 Acre Ft/year

## Water Use Totals

Water Use estimates are based on of milk production

Stock water Requirement	67.0 Acre Ft/yr
Commercial Parlor Use	10.2 Acre Ft/yr
Additional Cooling Use	0.0 Acre Ft/yr
<b>Water Use Estimate</b>	<b>77.2 Acre Ft/yr</b>

## Total Diversion Rate

**0.12 Cubic Feet/Second (CFS)**

**53 GPM**

(this diversion rate is the minimum rate required to pump the above water use estimate 24/7/365)

# Lagoon and Waste System Sizing Program



## Facility Runoff Calculation

### Runoff Areas

	CN #	CN#	Dimensions			
	1 in 5 yr win.	25 yr. 24 hr	Width	Length	#	Square Footage
Roofed Area	Monthly	storm				
	0	100	0	0	0	0
	0	100	0	0	0	0
Concrete & Asphalt	0	100	0	0	0	0
	0	100	0	0	0	0
	0	100	0	0	0	0
	0	100	0	0	0	0
	0	100	0	0	0	0
					Sub Total	0
Earthen Site						
Acres <3% Slope	80.3	91	68.5	*43560	2983860	< than 3% slope
Acres >3% Slope	86.9	100	0	*43560	0	> than 3% slope
Square Ft <3% Slope			0			
Square Ft >3% Slope			0			
Net Entire Site					2983860 ft^2	68.5 Acres

1 in 5 yr. Winter Numbers - Using NRCS AWMFH 651.1000

\*November through April weather data

Climatic Data Station	SHOSHONE
1 in 5 yr. precipitation	8.32 inches
Evaporation	2.1 inches
Net Precipitation	6.22 inches
25 yr. 24 hr. Storm	2 inches

### IDAWM Values

Runoff amount	180 day storage	25 yr 24 hr Storm
	1 in 5 yr Winter	
Roofs	0	0 ft3
Concrete	0	0 ft3
Earthen Site	352991	289341 ft3
Subtotal	352991	289341 ft3
Total Runoff To Contain		642332 ft3

## Waste Water Storage

Runoff 1 in 5 yr winter	352,991 ft3	2,640,370 gallons
Runoff 25 yr 24 hr storm	289,341 ft3	2,164,270 gallons
Precipitation on Lagoons	241,917 ft3	1,809,541 gallons
Commercial Water	218,654 ft3	1,635,534 gallons
Manure	102,656 ft3	767,869 gallons
Sludge	123,188 ft3	921,443 gallons
<b>Required Storage for 180 days</b>	<b>1,328,747 ft3</b>	<b>9,939,026 gallons</b>
Total Slurry Pond Volume	- ft3	- gallons
<b>Available Storage</b>	<b>1,615,091 ft3</b>	
Total Days of Aval. Storage	<b>219 days</b>	<b>286,344 ft3 Surplus Storage</b>

## Pond Dimensions



Pond Size	B1 Separator Pond	B1 Lagoon 1	B1 Lagoon 2	Calf Berm	SW Pump Pit	
	( ft )	( ft )	( ft )	( ft )	( ft )	
Width Side Slope	3	2	2.7	2	2	
Bottom Width	225	330	423.416	600	77	
Length Side Slope	3	2	2.7	2	2	
Bottom Length	72	166	300	250	67	
Total Depth	4	4.5	15	2	4.5	
Free Board	1	1	2	1	2	
Lagoon Precip ft3	11097	37524	87012	102750	3534	
LW	66	162	289.2	246	59	<b>Total Capacity</b>
LL	219	326	412.616	596	69	<b>1,615,091 ft3</b>
LD	3	3.5	13	1	2.5	<b>12,080,882 gallons</b>
Top length	201	312	342.416	592	59	
Top Width	48	148	219	242	49	<b>Subtotal Capacity</b>
Storage Volume IWMG ft3	35,991	173,115	1,252,387	144,937	8,661	<b>1,615,091 ft3</b>
Storage Volume IWMG Gal	269,213	1,294,898	9,367,857	1,084,131	64,783	<b>12,080,882 gallons</b>
excavated volume (yd3 )	1,893	8,400	55,204	10,860	657.33	<b>77,014</b>

Pond Size	0	0	0	0	0	
	( ft )	( ft )	( ft )	( ft )	( ft )	
Width Side Slope	0	0	0	0	0	
Bottom Width	0	0	0	0	0	
Length Side Slope	0	0	0	0	0	
Bottom Length	0	0	0	0	0	
Total Depth	0	0	0	0	0	
Free Board	0	0	0	0	0	
Lagoon Precip ft3	0	0	0	0	0	
LW	0	0	0	0	0	
LL	0	0	0	0	0	
LD	0	0	0	0	0	<b>Sub Total Capacity</b>
Top length	0	0	0	0	0	
Top Width	0	0	0	0	0	
Storage Volume IWMG ft3	-	-	-	-	-	<b>- ft3</b>
Storage Volume IWMG Gal	-	-	-	-	-	<b>- gallons</b>
excavated volume (yd3 )	-	-	-	-	-	<b>-</b>

Pond Size	0	0	0	0	0	
	( ft )	( ft )	( ft )	( ft )	( ft )	
Width Side Slope	0	0	0	0	0	
Bottom Width	0	0	0	0	0	
Length Side Slope	0	0	0	0	0	
Bottom Length	0	0	0	0	0	
Total Depth	0	0	0	0	0	
Free Board	0	0	0	0	0	
Lagoon Precip ft3	0	0	0	0	0	
LW	0	0	0	0	0	
LL	0	0	0	0	0	
LD	0	0	0	0	0	<b>Sub Total Capacity</b>
Top length	0	0	0	0	0	
Top Width	0	0	0	0	0	
Storage Volume IWMG ft3	-	-	-	-	-	<b>0 ft3</b>
Storage Volume IWMG Gal	-	-	-	-	-	<b>- gallons</b>
excavated volume (yd3 )	-	-	-	-	-	<b>-</b>

# AGTEC Lagoon Design



Producer Information		Facility Info	
Name:	Fitzgerald Brothers	Four Brothers Dairy	
Address:	0	0	
City:	Shoshone	Shoshone	
State:	0	0	
Zip Code:	0	0	
County:	Lincoln	Lincoln	
Project Description: EMP Design for the Process water and area of runoff for the Heifer raising area.			

## Animal Breakdown

Animal Type	# of Animals	Animal Weight (lbs)	Lincoln County LCO #'s	% Total Manure to Lagoon	Total Manure % to Slurry Pond
none	0	0	0.0	0%	0%
none	0	0	0.0	0%	0%
none	0	0	0.0	0%	0%
none	0	0	0.0	0%	0%
Heifer 10	3567	950	2853.6	0%	0%
Heifer 10	2796	550	1677.6	0%	0%
none	0	0	0.0	0%	0%
none	0	0	0.0	0%	0%
none	0	0	0.0	0%	0%
	6363	animals	4531.2	au's	

## Wash Water Estimates

	0	0	0	
# Cows milked	0	0	0	
Stantions/side	0	0	0	
Strings/milking	0.0	0.0	0.0	
Milkings per Day	0	0	0	0 milkings/day
Cow Prep.	0	0	0	0 gal/day 0 milkings/day 0 gal/cow/milking
Bulk Tank	0	0	0	0 gal/day
Pipelines	0	0	0	0 gal/day 0 cycles/wash 0 gallons/cycle
Claw Backflush	0	0	0	0 gal/day 0 gal/cycle 0 cycles/wash
Parlor Hand Washdown	0	0	0	0 gal/day 0 gal/min 0 min/milking
Deck Sprays	0	0	0	0 gal/day 0 gal/min 0 runtime sec 0 cycles/day
Deck Flush	0	0	0	0 gal/day 0 gal/min 0 min/cycle 0 cycles/day
Holding Pen Flush	0	0	0	0 gal/day 0 gal/min 0 min/cycle 0 cycles/day
Holding Pen Hand Washdown	0	0	0	0 gal/day 0 gal/min 0 min/milking
Sprinkler Pen Water Use	0	0	0	0 gal/day 0 heads 0 gpm/head 0 min/pen 0 % use
Milk Room Cleaning	0	0	0	0 gal/day
Water Trough Cleaning	0	0	0	0 gal/day 0 # of troughs 0 gal/trough 0 #/month
Miscellaneous	-1	0	0	0 gal/day
	-	-	-	<b>Total Parlor gal/day</b>
	-	-	-	<b>180 Day Volume ft3</b>
Manure from Parlor		0	ft3/day	
Storage period		180	days	Slurry Days of Storage 0
Total Manure from Parlor to Lagoon		-	ft3	Slurry Pond Volume ft3 -
Years between Solid sludge Cleanout		5	years	Volume Gal -
Sludge Volume		-	ft3	- Gallons



## Recyclable Water Use

	0	0	0
Milking Parlor Throughput	0	0	0 Cows/hr
Time Milking Per Day	0.0	0.0	0 hours/day
Plate Cooler Water Use	0	0	0 Gal/day
Water Cooled Compressor	0	0	0 Gal/day
Water Cooled Vacuum Pump	0	0	0 Gal/day
	0	0	0 Total Cooling Parlor Volume/day in gallons

## Water Use Evaluation

Clean Water Use	0 Gal/day
Cow Drinking water use	60,029 Gal/day
Commercial Parlor Use	0 Gal/day
Net Excess Cooling Water	0 Gal/day
Yearly Parlor Cooling Volume (amount exceeding that recycled)	0.0 Acre Ft/year

## Water Use Totals

Water Use estimates are based on of milk production

Stock water Requirement	67.2 Acre Ft/yr
Commercial Parlor Use	0.0 Acre Ft/yr
Additional Cooling Use	0.0 Acre Ft/yr
<b>Water Use Estimate</b>	<b>67.2 Acre Ft/yr</b>

## Total Diversion Rate

**0.10 Cubic Feet/Second (CFS)**

**46 GPM**

(this diversion rate is the minimum rate required to pump the above water use estimate 24/7/365)

# Lagoon and Waste System Sizing Program



## Facility Runoff Calculation

### Runoff Areas

	CN #		Dimensions		#	Square Footage
	1 in 5 yr win. Monthly	25 yr. 24 hr storm	Width	Length		
Roofed Area	0	100	0	0	0	0
	0	100	0	0	0	0
	0	100	0	0	0	0
Concrete & Asphalt						0
	0	100	0	0	0	0
	0	100	0	0	0	0
	0	100	0	0	0	0
	0	100	0	0	0	0
					Sub Total	0
Earthen Site						
Acres <3% Slope	80.3	91	58.6	*43560	2552616	< than 3% slope
Acres >3% Slope	86.9	100	0	*43560	0	> than 3% slope
Square Ft <3% Slope			0			
Square Ft >3% Slope			0			
Net Entire Site					2552616 ft^2	58.6 Acres

1 in 5 yr. Winter Numbers - Using NRCS AWMFH 651.1000

\*November through April weather data

Climatic Data Station	SHOSHONE
1 in 5 yr. precipitation	8.32 inches
Evaporation	2.1 inches
Net Precipitation	6.22 inches
25 yr. 24 hr. Storm	2 inches

### IDAWM Values

Runoff amount	180 day storage	
	1 in 5 yr Winter	25 yr 24 hr Storm
Roofs	0	0 ft3
Concrete	0	0 ft3
Earthen Site	301974	247524 ft3
Subtotal	301974	247524 ft3
Total Runoff To Contain		549498 ft3

## Waste Water Storage

Runoff 1 in 5 yr winter	301,974 ft3	2,258,769 gallons
Runoff 25 yr 24 hr storm	247,524 ft3	1,851,477 gallons
Precipitation on Lagoons	47,220 ft3	353,207 gallons
Commercial Water	- ft3	- gallons
Manure	- ft3	- gallons
Sludge	- ft3	- gallons
<b>Required Storage for 180 days</b>	<b>596,718 ft3</b>	<b>4,463,453 gallons</b>
Total Slurry Pond Volume	- ft3	- gallons
<b>Available Storage</b>	<b>627,149 ft3</b>	
Total Days of Aval. Storage	189 days	<b>30,431 ft3 Surplus Storage</b>

## Pond Dimensions



Pond Size	Andys Pond 1	Andys Pond 2	0	0	0	
	( ft )	( ft )	( ft )	( ft )	( ft )	
Width Side Slope	2.3	2	0	0	0	
Bottom Width	174	318	0	0	0	
Length Side Slope	2.3	2	0	0	0	
Bottom Length	67.21	180	0	0	0	
Total Depth	13	14	0	0	0	
Free Board	1	1	0	0	0	
Lagoon Precip ft3	8011	39209	0	0	0	
LW	62.61	176	0	0	0	Total Capacity
LL	169.4	314	0	0	0	627,149 ft3
LD	12	13	0	0	0	4,691,077 gallons
Top length	114.2	262	0	0	0	
Top Width	7.41	124	0	0	0	Subtotal Capacity
Storage Volume IWMG ft3	62,620	564,529	-	-	-	627,149 ft3
Storage Volume IWMG Gal	468,398	4,222,679	-	-	-	4,691,077 gallons
excavated volume (yd3 )	2,589	22,856	-	-	-	25,445

Pond Size	0	0	0	0	0	
	( ft )	( ft )	( ft )	( ft )	( ft )	
Width Side Slope	0	0	0	0	0	
Bottom Width	0	0	0	0	0	
Length Side Slope	0	0	0	0	0	
Bottom Length	0	0	0	0	0	
Total Depth	0	0	0	0	0	
Free Board	0	0	0	0	0	
Lagoon Precip ft3	0	0	0	0	0	
LW	0	0	0	0	0	
LL	0	0	0	0	0	
LD	0	0	0	0	0	Sub Total Capacity
Top length	0	0	0	0	0	
Top Width	0	0	0	0	0	
Storage Volume IWMG ft3	-	-	-	-	-	- ft3
Storage Volume IWMG Gal	-	-	-	-	-	- gallons
excavated volume (yd3 )	-	-	-	-	-	-

Pond Size	0	0	0	0	0	
	( ft )	( ft )	( ft )	( ft )	( ft )	
Width Side Slope	0	0	0	0	0	
Bottom Width	0	0	0	0	0	
Length Side Slope	0	0	0	0	0	
Bottom Length	0	0	0	0	0	
Total Depth	0	0	0	0	0	
Free Board	0	0	0	0	0	
Lagoon Precip ft3	0	0	0	0	0	
LW	0	0	0	0	0	
LL	0	0	0	0	0	
LD	0	0	0	0	0	Sub Total Capacity
Top length	0	0	0	0	0	
Top Width	0	0	0	0	0	
Storage Volume IWMG ft3	-	-	-	-	-	0 ft3
Storage Volume IWMG Gal	-	-	-	-	-	- gallons
excavated volume (yd3 )	-	-	-	-	-	-

# AGTEC Lagoon Design



	Producer Information	Facility Info
Name:	Fitzgerald Brothers	Four Brothers Dairy
Address:	0	0
City:	Shoshone	Shoshone
State:	0	0
Zip Code:	0	0
County:	Lincoln	Lincoln
Project Description:	EMP Design for the Process water and area of runoff for Barn 3.	

## Animal Breakdown

Animal Type	# of Animals	Animal Weight (lbs)	Lincoln County LCO #'s	% Total Manure to Lagoon	Total Manure % to Slurry Pond	
Lactating cow	14	2750	1400	0.0	8%	0%
none	0		0	0.0	0%	0%
none	0		0	0.0	0%	0%
none	0		0	0.0	0%	0%
none	0		0	0.0	0%	0%
none	0		0	0.0	0%	0%
none	0		0	0.0	0%	0%
none	0		0	0.0	0%	0%
none	0		0	0.0	0%	0%
	2750	animals	0.0	au's		

## Wash Water Estimates

	Barn 3			
# Cows milked	2750	0	0	
Stantions/side	40	0	0	
Strings/milking	68.8	0.0	0.0	
Milkings per Day	3	0	0	milkings/day
Cow Prep.	8250	0	0	gal/day 3 milkings/day 1 gal/cow/milking
Bulk Tank	1800	0	0	gal/day
Pipelines	1800	0	0	gal/day 4 cycles/wash 150 gallons/cycle
Claw Backflush	0	0	0	gal/day 0 gal/cycle 0 cycles/wash
Parlor Hand Washdown	2700	0	0	gal/day 30 gal/min 30 min/milking
Deck Sprays	0	0	0	gal/day 0 gal/min 0 runtime sec 206 cycles/day
Deck Flush	0	0	0	gal/day 0 gal/min 0 min/cycle 0 cycles/day
Holding Pen Flush	0	0	0	gal/day 0 gal/min 0 min/cycle 0 cycles/day
Holding Pen Hand Washdown	2700	0	0	gal/day 30 gal/min 30 min/milking
Sprinkler Pen Water Use	0	0	0	gal/day 0 heads 0 gpm/head 0 min/pen 0 % use
Milk Room Cleaning	500	0	0	gal/day
Water Trough Cleaning	2219	0	0	gal/day 45 # of troughs 750 gal/trough 2 #/month
Miscellaneous	0	0	0	gal/day
	19,969	-	-	Total Parlor gal/day
	480,542	-	-	180 Day Volume ft3
Manure from Parlor		516	ft3/day	
Storage period		180	days	Slurry Days of Storage 0
Total Manure from Parlor to Lagoon		188,203	ft3	Slurry Pond Volume ft3 -
Years between Solid sludge Cleanout		5	years	Volume Gal -
Sludge Volume		225,844	ft3	1,689,311 Gallons



## Recyclable Water Use

	Barn 3	0	0
Milking Parlor Throughput	360	270	0 Cows/hr
Time Milking Per Day	22.9	0.0	0 hours/day
Plate Cooler Water Use	57750	0	0 Gal/day
Water Cooled Compressor	0	0	0 Gal/day
Water Cooled Vacuum Pump	0	0	0 Gal/day
	57750	0	0 Total Cooling Parlor Volume/day in gallons

## Water Use Evaluation

Clean Water Use	57,750 Gal/day
Cow Drinking water use	109,639 Gal/day
Commercial Parlor Use	19,969 Gal/day
Net Excess Cooling Water	0 Gal/day
Yearly Parlor Cooling Volume (amount exceeding that recycled)	0.0 Acre Ft/year

## Water Use Totals

Water Use estimates are based on of milk production

Stock water Requirement	122.8 Acre Ft/yr
Commercial Parlor Use	22.4 Acre Ft/yr
Additional Cooling Use	0.0 Acre Ft/yr
<b>Water Use Estimate</b>	<b>145.2 Acre Ft/yr</b>

## Total Diversion Rate

**0.22 Cubic Feet/Second (CFS)**

**99 GPM**

(this diversion rate is the minimum rate required to pump the above water use estimate 24/7/365)

# Lagoon and Waste System Sizing Program



## Facility Runoff Calculation

### Runoff Areas

	CN #	CN#	Dimensions			
	1 in 5 yr win.	25 yr. 24 hr	Width	Length	#	Square Footage
Roofed Area	Monthly	storm				
	0	100	0	0	0	0
	0	100	0	0	0	0
	0	100	0	0	0	0
Concrete & Asphalt						
	0	100	0	0	0	0
	0	100	0	0	0	0
	0	100	0	0	0	0
	0	100	0	0	0	0
					Sub Total	0
Earthen Site						
Acres <3% Slope	80.3	91	142	*43560	6185520	< than 3% slope
Acres >3% Slope	86.9	100	0	*43560	0	> than 3% slope
Square Ft <3% Slope			0			
Square Ft >3% Slope			0			
Net Entire Site					6185520 ft^2	142.0 Acres

1 in 5 yr. Winter Numbers - Using NRCS AWMFH 651.1000

\*November through April weather data

Climatic Data Station	SHOSHONE
1 in 5 yr. precipitation	8.32 inches
Evaporation	2.1 inches
Net Precipitation	6.22 inches
25 yr. 24 hr. Storm	2 inches

### IDAWM Values

	180 day storage	
Runoff amount	1 in 5 yr Winter	25 yr 24 hr Storm
Roofs	0	0 ft3
Concrete	0	0 ft3
Earthen Site	731747	599802 ft3
Subtotal	731747	599802 ft3
Total Runoff To Contain		1331549 ft3

## Waste Water Storage

Runoff 1 in 5 yr winter	731,747 ft3	5,473,468 gallons
Runoff 25 yr 24 hr storm	599,802 ft3	4,486,515 gallons
Precipitation on Lagoons	392,956 ft3	2,939,314 gallons
Commercial Water	480,542 ft3	3,594,452 gallons
Manure	188,203 ft3	1,407,759 gallons
Sludge	225,844 ft3	1,689,311 gallons
<b>Required Storage for 180 days</b>	<b>2,619,094 ft3</b>	<b>19,590,820 gallons</b>
Total Slurry Pond Volume	- ft3	- gallons
<b>Available Storage</b>	<b>2,134,669 ft3</b>	
Total Days of Aval. Storage	<b>147 days</b>	

Excess process water from the Barn 3 Area is allowed to flow to the Barn 2 system. The Barn 2 system has excess capacity to store this additional water.

-484,424 ft3 Surplus Storage

## Pond Dimensions



Pond Size	B3 Pond 1	B3 Pond 2	B3 Pond 3	B3 Pond 4	B3 Old Flush	
	( ft )	( ft )	( ft )	( ft )	( ft )	
Width Side Slope	3	2	2	2	2	
Bottom Width	512	361	335	420	222	
Length Side Slope	3	2	2	2	2	
Bottom Length	172	172	169	365	120	
Total Depth	4	8	5	6	5	
Free Board	1	1	1	2	1	
Lagoon Precip ft3	60324	42533	38781	105011	18248	
LW	166	168	165	357	116	<b>Total Capacity</b> <b>2,134,669 ft3</b> <b>15,967,328 gallons</b>
LL	506	357	331	412	218	
LD	3	7	4	4	4	
Top length	488	329	315	396	202	<b>Subtotal Capacity</b> <b>1,462,183 ft3</b> <b>10,937,131 gallons</b>
Top Width	148	140	149	341	100	
Storage Volume IWMG ft3	234,168	370,211	202,929	564,069	90,805	
Storage Volume IWMG Gal	1,751,577	2,769,181	1,517,911	4,219,239	679,224	
excavated volume (yd3 )	11,852	15,947	9,569	32,005	4,318.52	73,692

Pond Size	B3 Compost Pond	Pen 20 Pond	0	0	0	
	( ft )	( ft )	( ft )	( ft )	( ft )	
Width Side Slope	3	2	0	0	0	
Bottom Width	449.1	340	0	0	0	
Length Side Slope	3	2	0	0	0	
Bottom Length	280	180	0	0	0	
Total Depth	5	5	0	0	0	
Free Board	1	1	0	0	0	
Lagoon Precip ft3	86137	41922	0	0	0	
LW	274	176	0	0	0	<b>Sub Total Capacity</b>
LL	443.1	336	0	0	0	
LD	4	4	0	0	0	
Top length	419.1	320	0	0	0	<b>672,486 ft3</b> <b>5,030,196 gallons</b>
Top Width	250	160	0	0	0	
Storage Volume IWMG ft3	451,985	220,501	-	-	-	
Storage Volume IWMG Gal	3,380,846	1,649,350	-	-	-	
excavated volume (yd3 )	21,303	10,389	-	-	-	31,692

Pond Size	0	0	0	0	0	
	( ft )	( ft )	( ft )	( ft )	( ft )	
Width Side Slope	0	0	0	0	0	
Bottom Width	0	0	0	0	0	
Length Side Slope	0	0	0	0	0	
Bottom Length	0	0	0	0	0	
Total Depth	0	0	0	0	0	
Free Board	0	0	0	0	0	
Lagoon Precip ft3	0	0	0	0	0	
LW	0	0	0	0	0	<b>Sub Total Capacity</b>
LL	0	0	0	0	0	
LD	0	0	0	0	0	
Top length	0	0	0	0	0	<b>0 ft3</b> <b>- gallons</b>
Top Width	0	0	0	0	0	
Storage Volume IWMG ft3	-	-	-	-	-	
Storage Volume IWMG Gal	-	-	-	-	-	
excavated volume (yd3 )	-	-	-	-	-	-

# AGTEC Lagoon Design



Producer Information		Facility Info
Name:	Fitzgerald Brothers	Four Brothers Dairy
Address:	0	0
City:	Shoshone	Shoshone
State:	0	0
Zip Code:	0	0
County:	Lincoln	Lincoln
Project Description:	EMP Design for the Process water and area of runoff for Barn 2.	

## Animal Breakdown

Animal Type	# of Animals	Animal Weight (lbs)	Lincoln County LCO #'s	% Total Manure to Lagoon	Total Manure % to Slurry Pond	
Lactating cow	14	1000	1400	0.0	8%	0%
none	0		0	0.0	0%	0%
none	0		0	0.0	0%	0%
none	0		0	0.0	0%	0%
none	0		0	0.0	0%	0%
none	0		0	0.0	0%	0%
none	0		0	0.0	0%	0%
none	0		0	0.0	0%	0%
none	0		0	0.0	0%	0%
	1000	animals	0.0	au's		

## Wash Water Estimates

	<b>Barn 2</b>	<b>0</b>	<b>0</b>	
# Cows milked	1000	0	0	
Stantions/side	16	0	0	
Strings/milking	62.5	0.0	0.0	
Milkings per Day	3	0	0	milkings/day
Cow Prep.	600	0	0	gal/day 3 milkings/day 0.2 gal/cow/milking
Bulk Tank	1100	0	0	gal/day
Pipelines	1200	0	0	gal/day 4 cycles/wash 100 gallons/cycle
Claw Backflush	0	0	0	gal/day 0 gal/cycle 0 cycles/wash
Parlor Hand Washdown	1800	0	0	gal/day 30 gal/min 20 min/milking
Deck Sprays	0	0	0	gal/day 0 gal/min 0 runtime sec 188 cycles/day
Deck Flush	0	0	0	gal/day 0 gal/min 0 min/cycle 0 cycles/day
Holding Pen Flush	0	0	0	gal/day 0 gal/min 0 min/cycle 0 cycles/day
Holding Pen Hand Washdown	1800	0	0	gal/day 30 gal/min 20 min/milking
Sprinkler Pen Water Use	0	0	0	gal/day 0 heads 0 gpm/head 0 min/pen 0 % use
Milk Room Cleaning	300	0	0	gal/day
Water Trough Cleaning	986	0	0	gal/day 20 # of troughs 750 gal/trough 2 #/month
Miscellaneous	0	0	0	gal/day
	7,786	-	-	<b>Total Parlor gal/day</b>
	187,371	-	-	<b>180 Day Volume ft3</b>
Manure from Parlor		188	ft3/day	
Storage period		180	days	Slurry Days of Storage 0
Total Manure from Parlor to Lagoon		68,438	ft3	Slurry Pond Volume ft3 -
Years between Solid sludge Cleanout		5	years	Volume Gal -
Sludge Volume		82,125	ft3	614,295 Gallons



## Recyclable Water Use

	Barn 2	0	0
Milking Parlor Throughput	144	270	0 Cows/hr
Time Milking Per Day	20.0	0.0	0 hours/day
Plate Cooler Water Use	50400	0	0 Gal/day
Water Cooled Compressor	0	0	0 Gal/day
Water Cooled Vacuum Pump	0	0	0 Gal/day
	50400	0	0 Total Cooling Parlor Volume/day in gallons

## Water Use Evaluation

Clean Water Use	50,400 Gal/day
Cow Drinking water use	39,869 Gal/day
Commercial Parlor Use	7,786 Gal/day
Net Excess Cooling Water	2,745 Gal/day

Yearly Parlor Cooling Volume (amount exceeding that recycled) 3.1 Acre Ft/year

## Water Use Totals

Water Use estimates are based on of milk production

Stock water Requirement	44.7 Acre Ft/yr
Commercial Parlor Use	8.7 Acre Ft/yr
Additional Cooling Use	3.1 Acre Ft/yr
<b>Water Use Estimate</b>	<b>56.5 Acre Ft/yr</b>

## Total Diversion Rate

**0.09 Cubic Feet/Second (CFS)**

**39 GPM**

(this diversion rate is the minimum rate required to pump the above water use estimate 24/7/365)

# Lagoon and Waste System Sizing Program



## Facility Runoff Calculation

### Runoff Areas

	CN #		Dimensions		#	Square Footage
	1 in 5 yr win. Monthly	25 yr. 24 hr storm	Width	Length		
Roofed Area	0	100	0	0	0	0
	0	100	0	0	0	0
	0	100	0	0	0	0
Concrete & Asphalt						0
	0	100	0	0	0	0
	0	100	0	0	0	0
	0	100	0	0	0	0
	0	100	0	0	0	0
					Sub Total	0
Earthen Site						
Acres <3% Slope	80.3	91	64	*43560	2787840	< than 3% slope
Acres >3% Slope	86.9	100	0	*43560	0	> than 3% slope
Square Ft <3% Slope			0			
Square Ft >3% Slope			0			
Net Entire Site					2787840 ft^2	64.0 Acres

1 in 5 yr. Winter Numbers - Using NRCS AWMFH 651.1000

\*November through April weather data

Climatic Data Station	SHOSHONE
1 in 5 yr. precipitation	8.32 inches
Evaporation	2.1 inches
Net Precipitation	6.22 inches
25 yr. 24 hr. Storm	2 inches

### IDAWM Values

Runoff amount	180 day storage	
	1 in 5 yr Winter	25 yr 24 hr Storm
Roofs	0	0 ft3
Concrete	0	0 ft3
Earthen Site	329801	270333 ft3
Subtotal	329801	270333 ft3
Total Runoff To Contain		600135 ft3

Process Water from Barn 3  
484,424 ft3

### Waste Water Storage

Runoff 1 in 5 yr winter	329,801 ft3	2,466,915 gallons	Barn 2 storage accepts excess process water from Barn 3 and is connected via pipeline to the heifer raising area.
Runoff 25 yr 24 hr storm	270,333 ft3	2,022,091 gallons	
Precipitation on Lagoons	385,464 ft3	2,883,273 gallons	
Commercial Water	187,371 ft3	1,401,534 gallons	
Manure	68,438 ft3	511,913 gallons	
Sludge	82,125 ft3	614,295 gallons	
Required Storage for 180 days	1,389,587 ft3	10,394,112 gallons	
Total Slurry Pond Volume	- ft3	- gallons	
Available Storage	2,452,447 ft3		
Total Days of Aval. Storage	318 days	1,062,860 ft3 Surplus Storage	578,436 Net Excess

## Pond Dimensions



Pond Size	B2 Settling ( ft )	B2 Lagoon 1 ( ft )	B2 Lagoon 2 ( ft )	B2 East 1 ( ft )	B2 East 2 ( ft )	
Width Side Slope	3	2	2	3	3	
Bottom Width	200	420	290	391.8	396.265	
Length Side Slope	3	2	2	3	3	
Bottom Length	100	200	175	370	286	
Total Depth	4	8.5	6.5	6.5	7.1	
Free Board	1	1	1	1	1	
Lagoon Precip ft3	13700	57540	34764	99302	77632	
LW	94	196	171	364	280	<b>Total Capacity</b>
LL	194	416	286	385.8	390.265	<b>2,452,447 ft3</b>
LD	3	7.5	5.5	5.5	6.1	<b>18,344,303 gallons</b>
Top length	176	386	264	352.8	353.665	
Top Width	76	166	149	331	243.4	<b>Subtotal Capacity</b>
Storage Volume IWMG ft3	47,256	544,920	242,222	706,324	594,475	<b>2,135,196 ft3</b>
Storage Volume IWMG Gal	353,475	4,076,002	1,811,819	5,283,302	4,446,671	<b>15,971,268 gallons</b>
excavated volume (yd3 )	2,451	23,217	10,803	31,415	26,099.92	<b>93,986</b>

Pond Size	B2 East 3 ( ft )	B2 East 4 ( ft )	Commod Collec ( ft )	0 ( ft )	0 ( ft )	
Width Side Slope	3	2	3	0	0	
Bottom Width	310.47	332.9	700	0	0	
Length Side Slope	3	2	3	0	0	
Bottom Length	224	165	36	0	0	
Total Depth	4.5	2.5	2.5	0	0	
Free Board	1	1	1	0	0	
Lagoon Precip ft3	47639	37626	17262	0	0	
LW	218	161	30	0	0	
LL	304.47	328.9	694	0	0	
LD	3.5	1.5	1.5	0	0	<b>Sub Total Capacity</b>
Top length	283.47	322.9	685	0	0	
Top Width	197	155	21	0	0	
Storage Volume IWMG ft3	213,624	77,243	26,384	-	-	<b>317,251 ft3</b>
Storage Volume IWMG Gal	1,597,910	577,776	197,349	-	-	<b>2,373,035 gallons</b>
excavated volume (yd3 )	10,419	4,858	1,827	-	-	<b>17,104</b>

Pond Size	0 ( ft )	0 ( ft )	0 ( ft )	0 ( ft )	0 ( ft )	
Width Side Slope	0	0	0	0	0	
Bottom Width	0	0	0	0	0	
Length Side Slope	0	0	0	0	0	
Bottom Length	0	0	0	0	0	
Total Depth	0	0	0	0	0	
Free Board	0	0	0	0	0	
Lagoon Precip ft3	0	0	0	0	0	
LW	0	0	0	0	0	
LL	0	0	0	0	0	
LD	0	0	0	0	0	<b>Sub Total Capacity</b>
Top length	0	0	0	0	0	
Top Width	0	0	0	0	0	
Storage Volume IWMG ft3	-	-	-	-	-	<b>0 ft3</b>
Storage Volume IWMG Gal	-	-	-	-	-	<b>gallons</b>
excavated volume (yd3 )	-	-	-	-	-	

# AGTEC Lagoon Design



	Producer Information	Facility Info
Name:	Fitzgerald Brothers	Four Brothers Dairy
Address:	0	0
City:	Shoshone	Shoshone
State:	0	0
Zip Code:	0	0
County:	Lincoln	Lincoln
Project Description:	EMP Design for the Process water and area of runoff for Barns 4 & 5.	

## Animal Breakdown

Animal Type	# of Animals	Animal Weight (lbs)	Lincoln County LCO #'s	% Total Manure to Lagoon	Total Manure % to Slurry Pond	
Lactating cow	14	4750	1400	0.0	8%	0%
none	0		0	0.0	0%	0%
none	0		0	0.0	0%	0%
none	0		0	0.0	0%	0%
none	0		0	0.0	0%	0%
none	0		0	0.0	0%	0%
none	0		0	0.0	0%	0%
none	0		0	0.0	0%	0%
none	0		0	0.0	0%	0%
	4750	animals	0.0	au's		

## Wash Water Estimates

	Barn 4	Barn 5	0	
# Cows milked	2750	2000	0	
Stantions/side	40	30	0	
Strings/milking	68.8	66.7	0.0	
Milkings per Day	3	3	0	milking/day
Cow Prep.	8250	6000	0	gal/day 3 milkings/day 1 gal/cow/milking
Bulk Tank	3300	1100	0	gal/day
Pipelines	1800	1500	0	gal/day 4 cycles/wash 150 gallons/cycle
Claw Backflush	0	0	0	gal/day 0 gal/cycle 0 cycles/wash
Parlor Hand Washdown	1800	1800	0	gal/day 30 gal/min 20 min/milking
Deck Sprays	0	0	0	gal/day 0 gal/min 0 runtime sec 206 cycles/day
Deck Flush	0	0	0	gal/day 0 gal/min 0 min/cycle 0 cycles/day
Holding Pen Flush	0	0	0	gal/day 0 gal/min 0 min/cycle 0 cycles/day
Holding Pen Hand Washdown	1800	1800	0	gal/day 30 gal/min 20 min/milking
Sprinkler Pen Water Use	0	0	0	gal/day 0 heads 0 gpm/head 0 min/pen 0 % use
Milk Room Cleaning	300	300	0	gal/day
Water Trough Cleaning	1479	1479	0	gal/day 30 # of troughs 750 gal/trough 2 #/month
Miscellaneous	300	0	0	gal/day
	19,029	13,979	-	Total Parlor gal/day
	457,928	336,404	-	180 Day Volume ft3
Manure from Parlor		891	ft3/day	
Storage period		180	days	Slurry Days of Storage 0
Total Manure from Parlor to Lagoon		325,078	ft3	Slurry Pond Volume ft3 -
Years between Solid sludge Cleanout		5	years	Volume Gal -
Sludge Volume		390,094	ft3	2,917,901 Gallons



## Recyclable Water Use

	Barn 4	Barn 5	0
Milking Parlor Throughput	360	270	0 Cows/hr
Time Milking Per Day	22.9	22.2	0 hours/day
Plate Cooler Water Use	55000	46667	0 Gal/day
Water Cooled Compressor	0	0	0 Gal/day
Water Cooled Vacuum Pump	0	0	0 Gal/day
	55000	46667	0 Total Cooling Parlor Volume/day in gallons

## Water Use Evaluation

Clean Water Use	101,667 Gal/day
Cow Drinking water use	189,377 Gal/day
Commercial Parlor Use	33,009 Gal/day
Net Excess Cooling Water	0 Gal/day
Yearly Parlor Cooling Volume (amount exceeding that recycled)	0.0 Acre Ft/year

## Water Use Totals

Water Use estimates are based on of milk production

Stock water Requirement	212.1 Acre Ft/yr
Commercial Parlor Use	37.0 Acre Ft/yr
Additional Cooling Use	0.0 Acre Ft/yr
<b>Water Use Estimate</b>	<b>249.1 Acre Ft/yr</b>

## Total Diversion Rate

**0.38 Cubic Feet/Second (CFS)**

**170 GPM**

(this diversion rate is the minimum rate required to pump the above water use estimate 24/7/365)

# Lagoon and Waste System Sizing Program



## Facility Runoff Calculation

### Runoff Areas

	CN #		CN#		Dimensions		#	Square Footage
	1 in 5 yr win.	Monthly	25 yr. 24 hr	storm	Width	Length		
Roofed Area	0	100	100		0	0	0	0
	0	100	100		0	0	0	0
	0	100	100		0	0	0	0
Concrete & Asphalt								0
	0	100	100		0	0	0	0
	0	100	100		0	0	0	0
	0	100	100		0	0	0	0
	0	100	100		0	0	0	0
							Sub Total	0
Earthen Site								
Acres <3% Slope	80.3	91	352	*43560	15333120	< than 3% slope		
Acres >3% Slope	86.9	100	0	*43560	0	> than 3% slope		
Square Ft <3% Slope			0					
Square Ft >3% Slope			0					
Net Entire Site							15333120 ft^2	352.0 Acres

1 in 5 yr. Winter Numbers - Using NRCS AWMFH 651.1000

\*November through April weather data

Climatic Data Station	SHOSHONE
1 in 5 yr. precipitation	8.32 inches
Evaporation	2.1 inches
Net Precipitation	6.22 inches
25 yr. 24 hr. Storm	2 inches

### IDAWM Values

Runoff amount	180 day storage	
	1 in 5 yr Winter	25 yr 24 hr Storm
Roofs	0	0 ft3
Concrete	0	0 ft3
Earthen Site	1813908	1486832 ft3
Subtotal	1813908	1486832 ft3
Total Runoff To Contain		3300740 ft3

## Waste Water Storage

Runoff 1 in 5 yr winter	1,813,908 ft3	13,568,033 gallons
Runoff 25 yr 24 hr storm	1,486,832 ft3	11,121,503 gallons
Precipitation on Lagoons	1,382,075 ft3	10,337,918 gallons
Commercial Water	794,332 ft3	5,941,603 gallons
Manure	325,078 ft3	2,431,584 gallons
Sludge	390,094 ft3	2,917,901 gallons
<b>Required Storage for 180 days</b>	<b>6,192,318 ft3</b>	<b>46,318,542 gallons</b>
Total Slurry Pond Volume	- ft3	- gallons
<b>Available Storage</b>	<b>8,729,456 ft3</b>	
Total Days of Aval. Storage	<b>254 days</b>	

## Pond Dimensions



Pond Size	B4ESC ( ft )	B4WSC ( ft )	B5NSC ( ft )	B5SSC ( ft )	B4 Pond 1 ( ft )
Width Side Slope	2	2	2	2.5	3
Bottom Width	316	282	225	475	677
Length Side Slope	2	2	2	2.5	3
Bottom Length	64	56	95	84	280
Total Depth	4	4	4	9	7
Free Board	1	1	1	1	1
Lagoon Precip ft3	13853	10818	14642	27332	129849
LW	60	52	91	79	274
LL	312	278	221	470	671
LD	3	3	3	8	6
Top length	300	266	209	430	635
Top Width	48	40	79	39	238
Storage Volume IWMG ft3	49,608	37,572	54,861	213,467	1,003,656
Storage Volume IWMG Gal	371,068	281,039	410,360	1,596,731	7,507,347
excavated volume (yd3 )	2,555	1,948	2,797	9,276	44,049.19
					<b>Total Capacity</b>
					<b>8,729,456 ft3</b>
					<b>65,296,333 gallons</b>
					<b>Subtotal Capacity</b>
					<b>1,359,164 ft3</b>
					<b>10,166,544 gallons</b>
					<b>60,626</b>

Pond Size	B4 Pond 2 ( ft )	B4 Pond 3 ( ft )	B4 Pond 4 ( ft )	Pen 40-1 ( ft )	Pen 40-2 ( ft )
Width Side Slope	3	3	2	3	3
Bottom Width	920	780	477	353.4	254
Length Side Slope	3	3	3	3	3
Bottom Length	400	331	424	300	215
Total Depth	3	8	8	5	6
Free Board	1	1	2	1	1
Lagoon Precip ft3	252080	176853	138540	72624	37408
LW	394	325	412	294	209
LL	914	774	469	347.4	248
LD	2	7	6	4	5
Top length	902	732	445	323.4	218
Top Width	382	283	376	270	179
Storage Volume IWMG ft3	704,632	1,603,413	1,066,812	378,523	226,385
Storage Volume IWMG Gal	5,270,647	11,993,529	7,979,754	2,831,354	1,693,360
excavated volume (yd3 )	39,578	68,768	54,637	17,860	10,331.56
					<b>Sub Total Capacity</b>
					<b>3,979,765 ft3</b>
					<b>29,768,644 gallons</b>
					<b>191,174</b>

Pond Size	Pen 40-3 ( ft )	Pen 36 ( ft )	B4 Compost ( ft )	Pantone ( ft )	Buckway ( ft )
Width Side Slope	3	3.5	3	3	3
Bottom Width	416	479.48	723.2	400.07	393.12
Length Side Slope	3	3.5	3	3	3
Bottom Length	208	174	500	260	270
Total Depth	6	6.5	5	6	11
Free Board	1	1	1	1	1
Lagoon Precip ft3	59272	57149	247696	71252	72708
LW	202	167	494	254	264
LL	410	472.48	717.2	394.07	387.12
LD	5	5.5	4	5	10
Top length	380	433.98	693.2	364.07	327.12
Top Width	172	128.5	470	224	204
Storage Volume IWMG ft3	369,700	368,985	1,359,818	453,364	838,661
Storage Volume IWMG Gal	2,765,356	2,760,011	10,171,436	3,391,160	6,273,183
excavated volume (yd3 )	16,804	16,630	63,607	20,547	34,771.59
					<b>Sub Total Capacity</b>
					<b>3,390,527 ft3</b>
					<b>25,361,145 gallons</b>
					<b>152,360</b>